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Products Finishing

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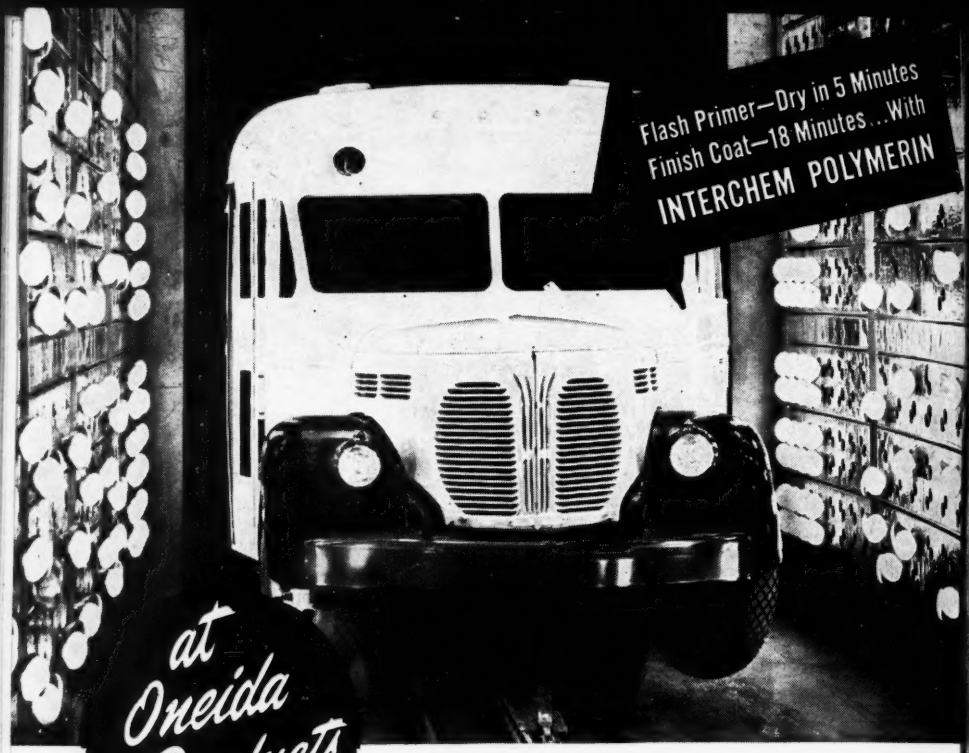

. . . . . Buses Complete with Pre-finished Fenders, and Tires Roll Through the Finishing Tunnel

Bus finishes are baked on the assembly line at efficient Oneida Products Corporation, Canastota, New York. Note in the illustration above that wheels, tires and pre-finished fenders are on the bus. What can't be seen is that the inside of the bus is already finished!

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"18-Minute Dry" Finish Coat Is Interchem Polymerin

Interchem Polymerin is not only a fast-bake coat, it is a low-bake coat as well. The baking period for the bus in the infra-red oven shown above is 18 minutes, the temperature 250°F. This low temperature was an important factor in the integration of the finishing operation into the assembly line. Polymerin is beautiful, hard, and durable. It possesses high resistance to moisture, marring, acids, and alkalis.

For more information about Interchem Polymerin and Red Oxide Flash Primer . . . or any of the many other Interchem Finishes for industry . . . write Interchemical Corporation, Finishes Division, 57 State Street, Newark 1, New Jersey.

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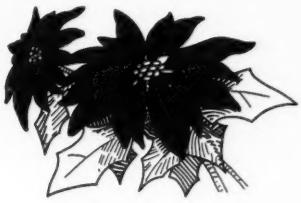


Each year at this time we of the staff of PRODUCTS FINISHING pause to extend to you our many advertisers and readers the Season's Greetings and sincere thanks for the splendid cooperation and assistance you have rendered us during the past months in the preparation of this magazine. Through your loyal support of PRODUCTS FINISHING this magazine has reached the high-ranking position it now holds in the metal-finishing field.

We pledge anew our endeavor to uphold, and improve where possible, the task of presenting articles and other information of highest caliber and maximum interest to those engaged in the cleaning, plating, polishing, and finishing of metal products. In the year that lies ahead, many new products, materials, and processes of interest to individuals in the metal-finishing field will be developed; therefore, the job before us is to see that you receive information regarding these developments in a clear, intelligent, and educational manner so as to enable you to perform your allotted tasks with maximum ease, efficiency and productivity.

To each one of you — advertisers, readers, contributors — we wish a very Merry Christmas and Successful and Happy New Year.

DECEMBER, 1947 Vol. 12, No. 3

Cleaning and Phosphate Coating Home Appliances at Hotpoint, Inc.

Fig. 1—Electric water heater shells awaiting a trip on conveyor line through power spray phosphatizing installation. The worker in the foreground is smoothing the surface of a heater shell with a portable electric tool.

By NORMAN P. GENTIEU

HOTPOINT, Inc., appliance manufacturing affiliate of General Electric, produces a wide variety of appliances for the home and supplements this production with intelligent, overall home planning by means of expertly designed layouts for present and prospective home owners. Electric refrigerators, ranges, electric dishwasher sinks, wringer-type washers, garbage disposal units, water heaters, ironers, home freezers, clothes dryers, automatic electric washers, and steel kitchen cabinets are among the up-to-date necessities produced by Hotpoint for busy housewives who appreciate attractive appearance as well as functional utility in products which are designed to alleviate the traditional burden of housework.

A close examination of two of the above named household appliances will illustrate the craftsmanship that goes into the making of all Hotpoint products. The two items selected for detailed examination are Hotpoint electric water heaters and apartment-size ranges.

In their embryonic state, these appliances bear slight resemblance to the finished product. They are received at the plant in the form of large sections of sheet steel that are protected from rusting during transit and storage by a thin film of slushing oil, which is removed when the metal is prepared for the final finish.

At the beginning of the production line, the sheet metal is cut into properly dimensioned parts and then stamped out, perforated, and shaped according to blueprint. These operations are generally accomplished by lifting a flat sheet from one pile, transporting it to various stamping machines which cut out specified pieces, and then placing the perforated metal on another pile where it remains until it is shaped by bending or rolling on specially designed machines. Spot welding completes the forming operations and then the assembled shell is made smooth by means of portable grinding wheels, as shown in Fig. 1, which are operated by workers trained in the detection of dents, bumps, imperfections, and so on.

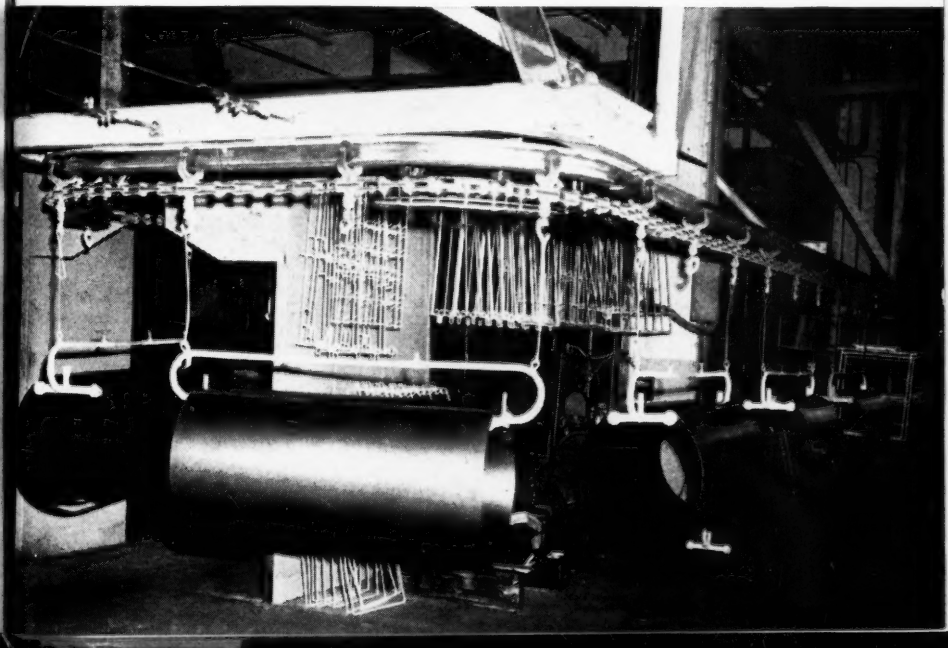
After forming of the shells is completed, they are racked on the conveyor line that will carry them through the cleaning, phosphatizing, and painting stages. Electric water heater shells are usually accompanied by other component parts such as top plates, while the apartment-size electric ranges travel along in company with their component parts. The type of appliance being processed at any one time is determined by the complex production schedule at Hotpoint.

Parts are racked in quantities of a dozen or more on the conveyor line which is located parallel to the cleaning and conditioning installation. A sharp U-turn brings the parts to the entrance of a power spray phosphatizing installation, as shown in Figs. 2 and 3, where they are freed, in the first stage, of the protective film of slushing oil and incidental surface soil. The chemical used for cleaning and phosphate coating in Stages 1 and 2 is "DURIDINE,"* a dual-action phosphatic cleaner and conditioner.

In Stage No. 2, the phosphate spray makes contact with a chemically clean metallic surface and the impingement, at a specified pressure, of the phos-

* Trade Mark Reg. U. S. Pat. Off. by American Chemical Paint Company for Metal Coating and Cleaning Chemicals

Fig. 2—Electric water heater shells entering Stage No. 1 of the power spray installation for cleaning and phosphate-coating



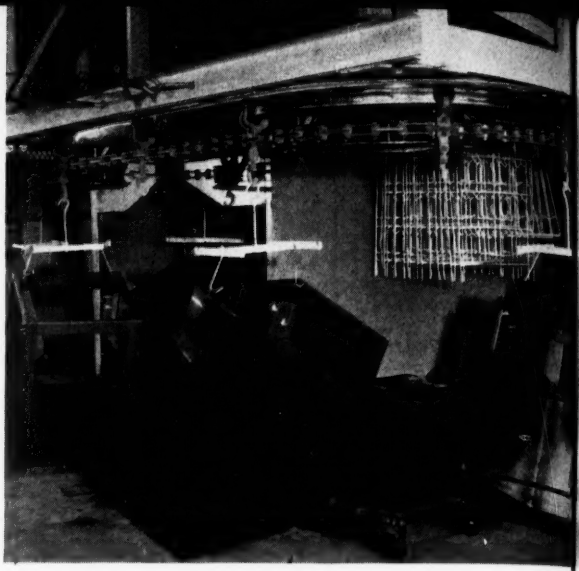


Fig. 3 — Apartment - size ranges entering Stage No. 1 of the phosphatizing installation

phatizing chemicals on the steel produces a thin, adherent, and uniformly - textured phosphate coating, ideal for bonding paint. In Stage No. 3, a clean water rinse removes superfluous chemical deposition and, in the final stage, the rinse is slightly acidulated to neutralize any traces of lime salts which are normally present in rinse water used directly from the mains.

Before emerging from the power spray washing installation, the workpieces are passed over open flames, as shown in Fig. 4, which provide for complete drying, and are then carried on the conveyor line to an upper level for painting. The electric ranges are immersed once in a deep tank of white enamel and the water heater shells are sprayed twice, once with a prime coat and once with a final white enamel coat, as shown in Fig. 5. Prior to the application of the final coat, the electric water heater shells are carefully examined by workmen for possible flaws and are wiped with clean dry cloths to remove any dust which may have accumulated during the drying period.

As the conveyor line proceeds from the final paint application station, the workpieces dry at a prede-

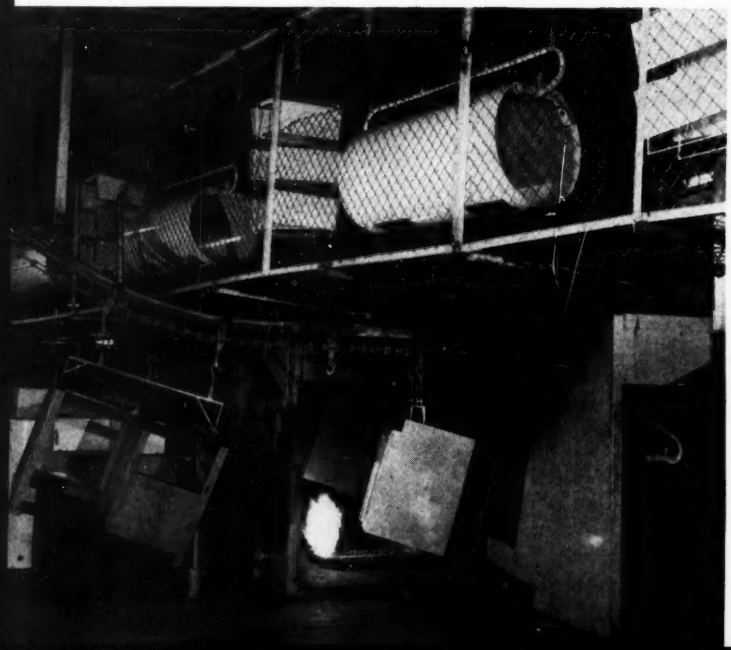


Fig. 4 — The gas flames over which the cleaned and coated metal shells pass serve to dry the surfaces completely prior to painting.

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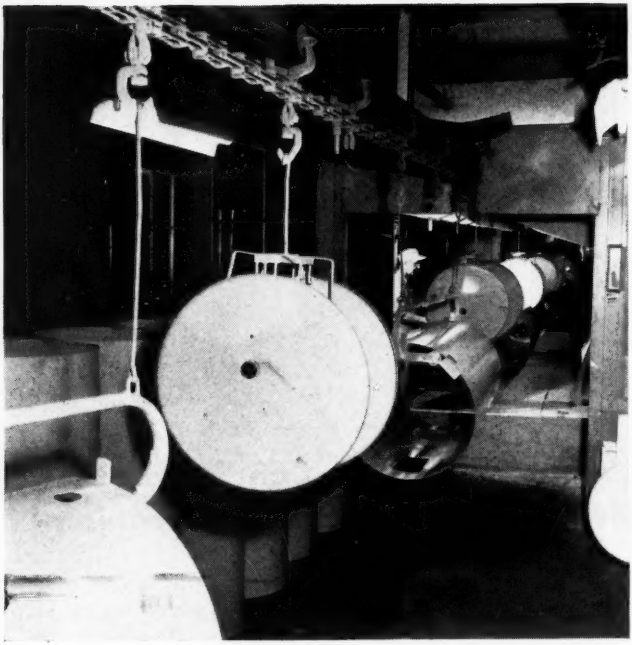

Fig. 5—After the application of a white prime coat, the water heater shells are painted with white finish enamel which will be baked on.

termined rate and, at the proper time, are carried to various locations on the assembly lines, as shown in Fig. 6, where all exterior and interior mechanism is installed. Figure 7 shows three different sizes of finished Hotpoint electric water heaters.

To assure the maintenance of a high quality finish on all products, Hotpoint chemists regularly check the phosphatizing bath and the finish enamels and compare coated samples with control standards. Painted metal surfaces produced under this regular schedule of analysis and control feature long finish life and are well able to withstand the ravages of moisture, grease, soot, cooking fumes, rough handling, and the myriad other destructive forces to which home appliances are subjected.

Having been prepared with a phosphate treatment before painting, the electric water heater shells and the electric ranges in their finished state feature maximum adhesion of the protective and decorative enamel. Moreover, the invisible strength inherent in the non-metallic phosphate coating

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Fig. 6—Overhead view of enameled water heater shells moving on the conveyor line to the final assembly area

supplements the functional ability of the appliance with the desirable features of long life and lasting beauty for the finish.

The oven of the Hotpoint apartment-size range is of one-piece heavy gage steel construction with rounded corners and embossed shelf supports. The finish of the oven is smooth, fired-on porcelain enamel. The one-piece welded steel construction of the range body eliminates the use of bolts, nuts, screws, and rivets; the one-piece top allows for easy cleaning.

Oven equipment includes two rust-proof shelves, one of which is reversible to provide for maximum use of oven space. The switch knobs and oven door handle have a chrome finish to resist rusting or discoloration. The snap-on type knobs can be easily removed if necessary.

The complete design of the Hotpoint apartment-size range comprises a tri-

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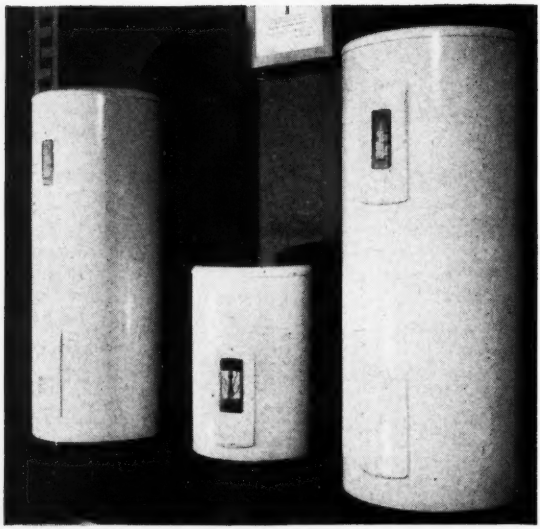

Fig. 7—Three sizes of Hotpoint electric water heaters. The finished product presents an attractive and lustrous surface which is protected by the unseen bond of non-metallic phosphate imparted to the steel during pretreatment.

ple-coat stain-resistant white porcelain enamel cooking top, white baked-on Calgloss body, and white porcelain enamel front panels.

The construction of the Hotpoint electric water heater includes a steel outer shell with white baked-on Calgloss finish, and a magnesium tube which extends through the length of the tank for protection in limited corrosive water areas.

(All photos courtesy Hotpoint, Inc., General Electric Affiliate, Chicago, Ill.)

"Guide to Selection of Durco Corrosion Resisting Alloys," a four-page bulletin published by The Duriron Co., Dayton 1, Ohio, lists 155 corrosives in alphabetical order and shows which of five Durco alloys offers most satisfactory resistance to each corrosive. A table is provided which lists the mechanical properties of each alloy. The alloys discussed are Duriron and Durichlor, high silicon irons; Durimet 20, an austenitic stainless steel; Durco D-10, a nickel-base alloy; Chlorimet 3, a nickel-molybdenum-chromium alloy; and Chlorimet 2, a nickel-molybdenum alloy. Copy of Bulletin 100 free upon request.

"Carbon Tetrachloride Properties and Uses" is the title of a 32-page booklet issued by the Stauffer Chemical Co., 420 Lexington Ave., New York 17, N.Y. The booklet contains both technical and general data concerning carbon tetrachloride and is intended to serve as a ready reference book for those using this product. Some of the technical phases discussed are the specifications of carbon tetrachloride, physical properties, azeotropic mixtures, vapor pressure-temperature relationship of carbon tetrachloride and other chlorinated hydrocarbons, solubility of water in carbon tetrachloride, stability, action on metals, non-inflammability, solvent power, chemical properties, binary mixtures, and the testing of carbon tetrachloride. Its many uses and applications are described, with a section included which fully reviews the approved instructions for the safe handling and use of carbon tetrachloride.

Copy of the booklet is available free to mechanical executives addressing requests on their company letterheads.

Polishing Wheels and Compounds. The E. Reed Burns Manufacturing Corp., 40-42 Withers St., Brooklyn 11, N. Y., now has available a series of six illustrated bulletins containing descriptive information on (1) Erbco Canvas Polishing Wheels; (2) "Aluminite" Paste for polishing all stainless metals; (3) "Emerite" Emery Paste for polishing wheels or buffs; (4) "Steelshine" Rouges for use on stainless steel, corrosion-resistant alloys, and carbon steels; (5) "Tripolex" Composition for cutting down and buffing all non-ferrous metals and for finishing celluloid, hard rubber, lacquer, plastics, and so on; and (6) Burnsrouges for either cutting or coloring. Copy of any or all bulletins is available free upon request.

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Another, its ability to outlast the tank itself.

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So outstanding is their resistance to corrosive pickling solutions, that THE HAUSER-STANDER TANK COMPANY of Cincinnati, Ohio, frequently suggests re-use of Monel tie-rods in new tanks!

Note the illustrations on this page. One tank is new; one is old. *But the tie-rods are the same.* Hauser-Stander took them from the old pine tank where they had seen seven years of continuous service, and used them to bind the new tank.

On occasion, Hauser-Stander has taken Monel rods which have served in *two* wooden tanks, and put them into a *third*. It's possible to do this because corrosion-resistant Monel combines high strength and high yield point with high ductility. Even under severe conditions, Monel retains these properties.

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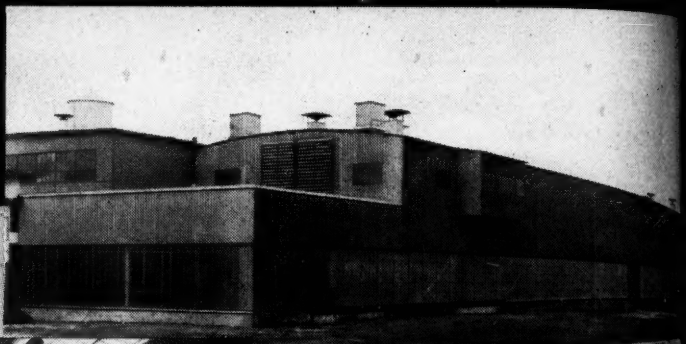
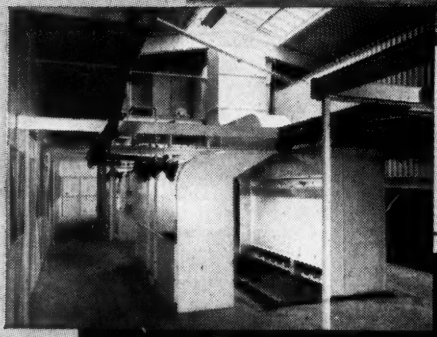
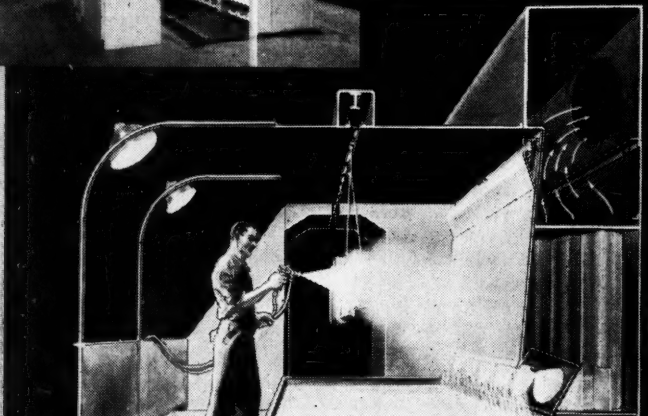




Above is the completely housed-in Finishing System shown at the Right. This System, Installed for American Central Mfg. Corp., was built Adjacent to Manufacturing Buildings—the Housing Becoming an Integral Part of the System. At Left: Interior of One of Two Complete Finishing Systems Planned, Engineered, Built and Installed by Mahon for All-Steel Equipment Corp., Aurora, Ill.



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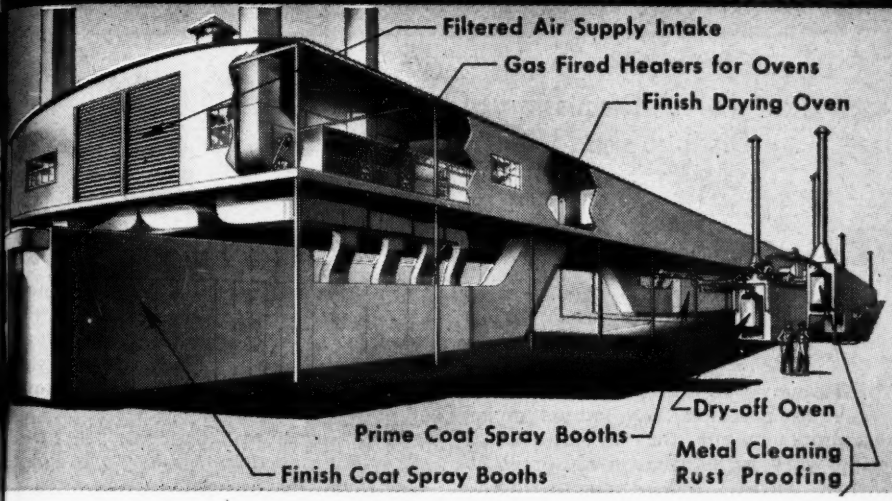

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Barrel Finishing of Metal Products

Part 16—A Discussion of Round Cylinder Barrels As Distinguished from Six or Eight-Panel Barrels

By H. LEROY BEAVER
Barrel Finishing Consultant
Lansdale, Pennsylvania

THERE have been ever so many instances during the publication of this and a previous series of discussions on barrel finishing procedure where someone asks the question "Why cannot we use a simple cylinder for our barrel finishing work rather than a six or eight-sided barrel?" The persons asking such a question have then gone on to say that they chance to have a steel shell boiler which they were considering equipping with shafts at either end and with tight and loose pulleys for operation as a barrel, or they felt that a simple oil drum mounted on roller drives in much the same manner as a typical drum mixing device would be adequate for barrel finishing work.

It has been argued that in a simple cylindrical form of barrel shell there are many advantages and that above all things the principal and effective work action is produced by the gravitational pull downward of the mass within the barrel and that it is the sliding contact of the mass against the inner periphery of the barrel shell itself that produces the greater part of the effective results of the operation. With this contention we cannot in any sense agree because it is an exact antithesis of every experiment we have made wherein simple round shells have been compared with either the six or eight-paneled type of barrels.

We know many barrel manufacturers who produce from the very smallest to the very largest types of barrel finishing equipment and none of them has ever attempted to even casually offer to the manufacturing field a simple cylindrical drum or barrel in the guise of barrel finishing equipment. If it were true that a simple cylinder was as effective as either a six or eight-sided barrel, then the problems of production of every barrel-maker we know would be immeasurably simplified since it would be far easier to produce simple cylinders than any of the paneled type barrels. It is true that there are some types of very large ball or pebble mills which operate at comparatively higher speeds and with either porcelain balls or flint or Danish Pebbles that are cylindrical in form. However, in such cases it will also be noted that these mills are generally buhrstone lined, and it is the

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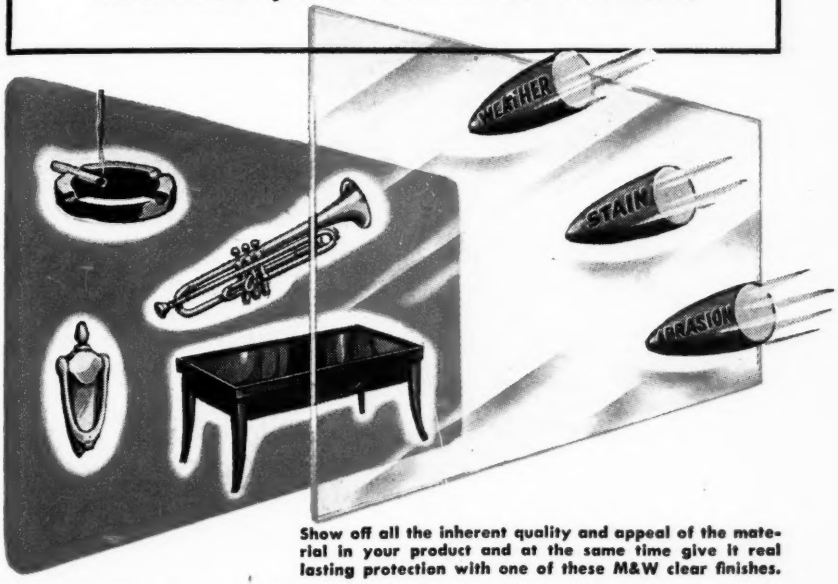

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churning or writhing action that is sought here in the matter of the pulverizing of various materials. We must not, however, in any sense confuse any of these operations with a barrel operation performed on various types of metal products in some one form or other of the finishing cycle.

Down through the years we have conducted experiments almost without

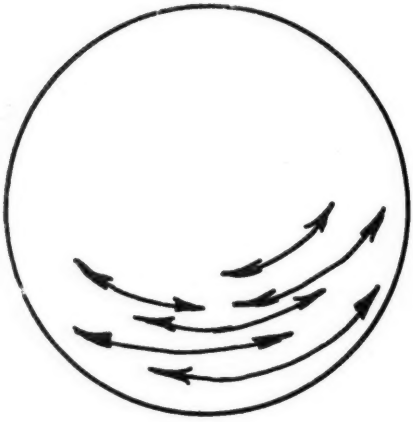

Fig. 1—This illustration shows the manner in which materials in a crock or bottle-type barrel are tossed back and forth in the bottom during operation at a speed to produce finishing results.

number on various sizes and shapes of crocks which, of course, are earthenware and simply cylindrical in form. These have been operated both in a horizontal position, as well as in various tilted positions in much the same manner as the typical oblique tilting barrels sometimes designated as "pear-shaped" barrels. Then again we have mounted in the same jig the typical five-gallon size spring water bottles which are familiar to most people. Whether we operated with minerals in their various forms or steel materials, the results were always the same and could be expressed in a single word, "unsatisfactory." At any adequate speed that might be used to produce finishing results, the materials in the crock or bottle simply were tossed back and forth in the bottom, as shown diagrammatically in Fig. 1.

In order that we might clearly observe the action that took place, no soap lubricant was used, but in its stead a simple solution of 4 oz. per gal. of sodium thiosulphate which has somewhat of a slippery soapy feel and through which the entire action could be observed. At no time in either the large crock or large bottle was the mass ever carried upward as much as one-third of the diameter of the barrel and, when the speed was increased, a point was reached where the entire mass in the container stood practically inert and the container simply slid around and around the mass.

As practically every barrel manufacturer well knows, our information files, as well as the files of the Editorial Department of PRODUCTS FINISHING, contain all of the literature issued from time to time by these various barrel manufacturers, and on this question of the efficiency of simple cylinders perhaps we might best quote from the literature of just one of these manufacturers. Please note, however, that it will be a manufacturer who has at least forty years of practical experience in the large barrel field, no less indeed than the Abbe Engineering Company of New York. The following is the company's studied conclusion regarding simple barrel shells:

"Abbe unlined mills are made of abrasion resistant extra heavy gauge, high carbon or chrome manganese alloy steel, the cylinders and flanged heads being made of the same material and welded inside and outside for maximum strength." And now note particularly the following:

"BAFFLES—The grinding action of the steel balls and material gives the interior of the mill a highly polished surface, **causing a sliding and slipping**

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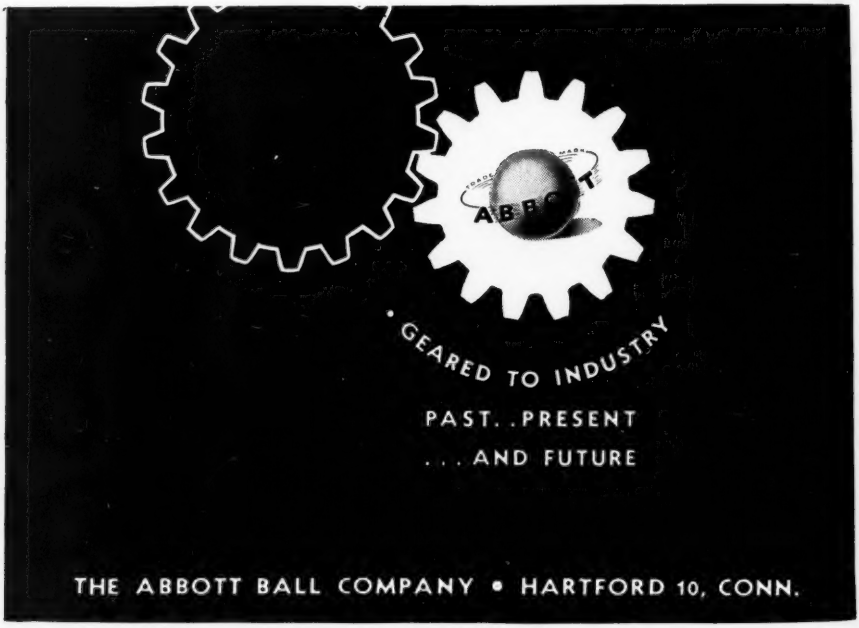
action and consequently decreased grinding efficiency and undue wear on the shell. To overcome this, baffling is employed to produce a cascading action to the steel balls and help break up and disperse the material. This baffling may be in the nature of waves in the mill surface or a series of inserted fixed or removable bars."

You will notice that we have emphasized a group of words in the above quotation and even though this has reference to an operation for the reduction of pigments being ground with steel balls, the motion is identical to what it would be were any metallic materials included as a part of the mass, whether for burring or the general reduction of surface area.

There must be just as many things about barrel finishing procedure that we do not know as there are things that we do know. It has been contended that such comment as we have made from time to time regarding the value of what we have termed the "high and narrow" type of barrel is pretty much a figment of the imagination and that pressure developed in this type of barrel has no bearing on its surface removal value and that its greatest effectiveness, if such there be, comes from the slipping and sliding action of the mass due to the downward gravitational pull on the mass. Let us examine this a bit in just one case.

Among our research clients we have a manufacturer of large quantities of small forgings which are reduced in area and surface finished in these selfsame high and narrow type of barrels. The finishing material used is what is known as Mica schist; in other words, fragmented granite, which is also largely used in the poultry industry, and of a size known as "turkey." The barrels are of the conventional heavy duty cutting-down variety with the periphery or shell of each, as well as



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the end plates, being of ¾-inch thickness. As of a few weeks ago, the round outer shells of all ten of these barrels are still serviceably heavy and intact,

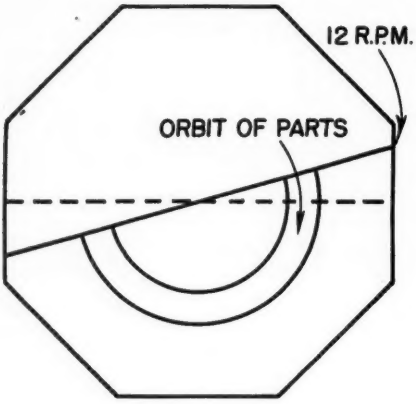


Fig. 2—In a 30-inch diameter high and narrow barrel operated at 12 r.p.m., the orbit of travel of the parts in process would be established at a point about equidistant between the center of the axis of the barrel and the periphery of the barrel, as shown herewith.

but in every case it has been necessary to order three sets of end plates to replace those that have worn completely through and were too thin to withstand the load action. The barrels are operated at a uniform speed of 12 r.p.m. and the point of wear through occurs at precisely the same area in each plate; that is, about two-thirds of the distance from the center of the axis of the barrel outward toward the inner periphery of the barrel. Further than this, the manufacturer of these barrels tells us that it is not at all unusual for one shell to outwear at least three and in many cases more than three sets of end plates before it is necessary to replace the cylindrical shell, which seems to rather nicely dispose of the contention that the major action is derived from this so-called slippage of the load in the barrel.

More times than you readers could know have we wished that we commanded a more extended vocabulary so as to enable us to paint these word pictures in such a manner that you could see them just as we have seen many of the things we undertake to describe for you. From time to time we have inserted line drawings which we always hope will tend to clarify the printed text, and we will try again in this case.

As to the mechanics of the barrel finishing operation itself, whether we are using abrasives for cutting down or soap solution for bright finishing, we do know that parts in process revolve around the center of the axis of the barrel in what we might best describe as their orbit. This orbit of travel is determined by the centrifugal force exerted by the speed at which the barrel is operated. In other words, in a 30-inch diameter high and narrow barrel operated at 12 r.p.m., the orbit of travel of the parts in process would

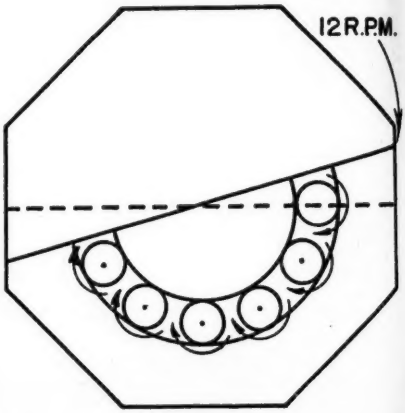
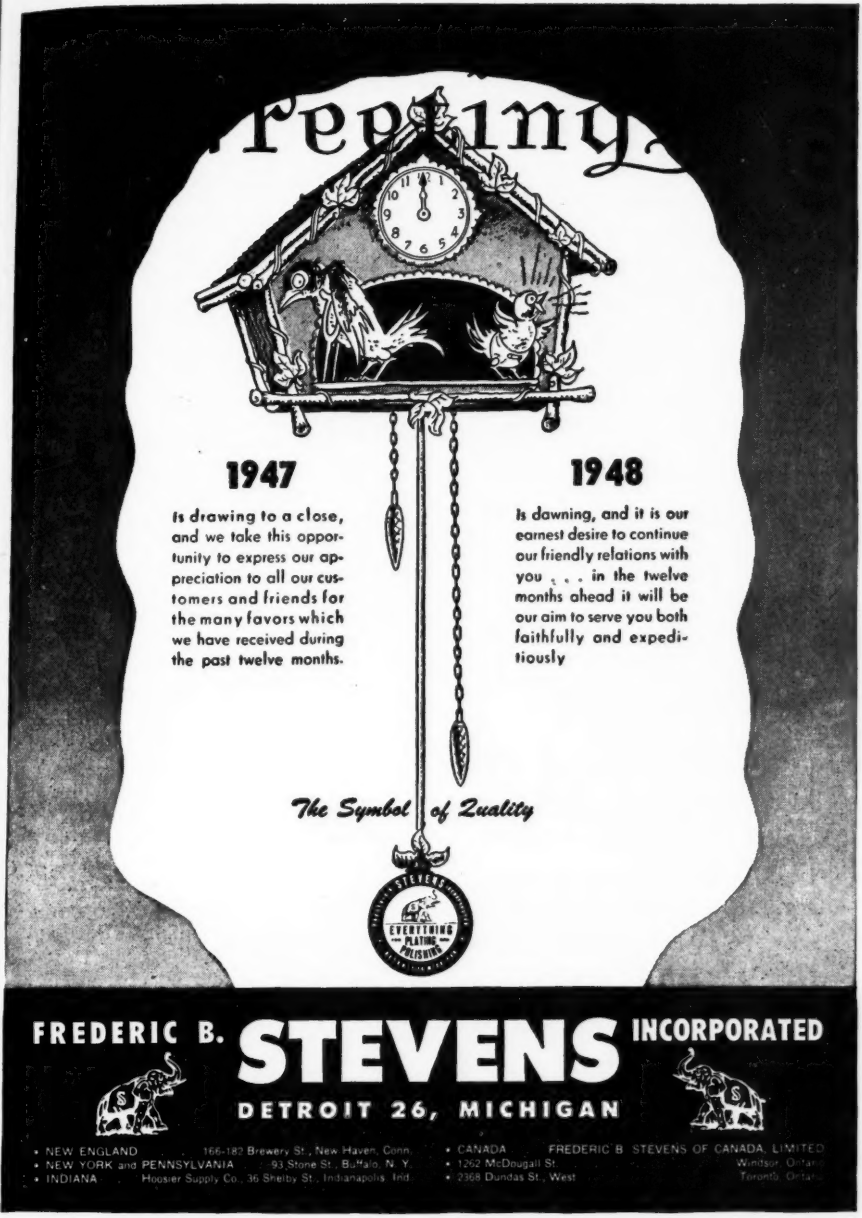


Fig. 3—While the parts in process are traveling in their own orbit around the center of the axis of the barrel, they are, at the same time, revolving around their own axis, as shown in this illustration.

be established at a point about equidistant between the center of the axis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Is drawing to a close, and we take this opportunity to express our appreciation to all our customers and friends for the many favors which we have received during the past twelve months.
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of the barrel and the periphery of the barrel or substantially as shown in Fig. 2.

The foregoing is not the only revolution about a common center that we find in the mechanics of barrel finishing, because while the parts we have mentioned are traveling in their own orbit around the center of the axis of the barrel, they are at the same time revolving around their own axis, as indicated in Fig. 3.

Thus, it may be easily seen that when comparatively large parts are operated in a barrel the speed can be maintained in such a way that at no time in the entire operating cycle will the parts even touch the periphery of the barrel but will be, shall we say, centrally suspended within the barrel finishing mass and at all times under action in that mass.

In a barrel grinding operation where the specific gravity of the abrasive material, or shall we say of the mass in which the abrasive material is incorporated, is reasonably comparable to that of the parts to be finished, the action is not unlike that of a centerless grinder. The parts are not held in any stable position but are suspended within the finishing mass and under action within that mass. Where the parts do touch the sides of the barrel, a certain amount of cutting action also occurs, but to say that the major part of the reduction of area results through contact with the periphery of the barrel is simply not borne out in any experiments we have ever made. There is only one condition where we might imagine any such action taking place and that would be where the relation of the specific gravity of the finishing material and the parts to be finished were at such a wide variance that the heavier parts to be processed, due to their greater inertia or shall we say excess of specific gravity, would filter through the mass of finishing material to the bottom of the load in the barrel, leaving the lighter finishing material floating on top and constituting what we would not hesitate to term as about the poorest operating factor we could imagine.

A few months back, we suggested a new method of evaluating steel burnishing materials and since then we have been asked whether we could also provide some comparative figures regarding the difference between steel balls, Danish Pebbles, and porcelain balls. Therefore, we are submitting the following information:

Size Av. per lb.	Steel Balls	Danish Pebbles	Porcelain Balls
½"	52	100	133
¾"	16	40	50
1"	6.4	26	25

We have no figures covering the smaller size ranges but as a general rule it is estimated that steel burnishing or grinding materials will average about three times the weight for equal bulk as do most of the natural or artificially created barrel finishing mate-

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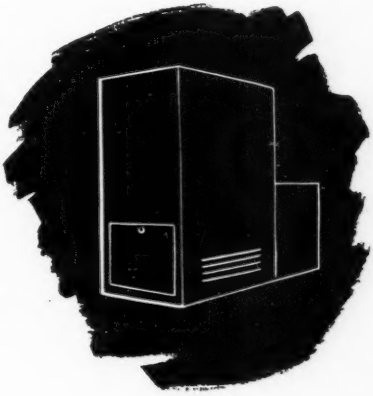

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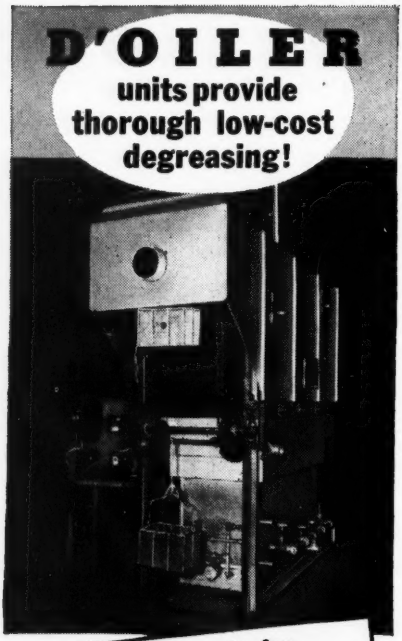

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Avoid the pitfalls of improper degreasing methods by getting the expert recommendations of our technical staff.

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rials. It might be well to remember in this connection that, according to our best information, it was about the year 1885 that Edmunds first started his experiments in barrel finishing in England and that many of the trial and error tests that he made have stood us in good stead here in our development of both barrels and finishing materials. Here too, we have as a first instance the observation of the cylindrical perfectly smooth interior separator used in a stone crushing operation to separate the sizes which led to the building of a simple cylinder barrel. This being completely unsatisfactory, a polygonal shape barrel was adopted and even further it was built on an oscillating principle which later was abandoned and a straight polygonal barrel was used.

Barton, Baird and Abbott, who constitute the originators of the three types of barrels most used in American industry, also experimented with simple cylindrical shells and all three of them abandoned the simple round cylinder shell type as being, to use George E. Abbott's expression in discussing it with us, just plain "no good," or as Everett Barton said of his first attempt, which was a small cylindrical wooden keg, that it didn't accomplish what he intended it should.

If, however, any of you readers insist on trying to use simple cylindrical shells we might advise that you use some type of baffles in order to provide somewhat the same action within the barrel that would be derived from either a six or eight-sided design. Seven baffle bars mounted equidistant from each other in the barrel interior will provide about the same amount of "lift" to the mass as would the panels of an eight-sided barrel, but not in so satisfactory a way. Each panel in a barrel provides a certain amount of "lift" to the entire mass which in mechanics would be termed an "effort," and each such "effort" produces a "force," so that when we have the

* footnote on good shop-keeping

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"force" provided by this lifting effort, coupled with the force of gravity which pulls downward on the mass to which we add the centrifugal force produced in the revolution of the barrel, we arrive in a rather effortless way at a realization of a combination of all of these forces which in mechanics is termed the final or "resultant" force. It is this resultant force that produces the cutting down or polishing effect and nothing else as anyone at all grounded in theoretical and applied mechanics can tell you. Therefore, just dismiss from your mind any other theorizing that leads off on a tangent to a spot which might pretty well be designated as exactly nowhere.

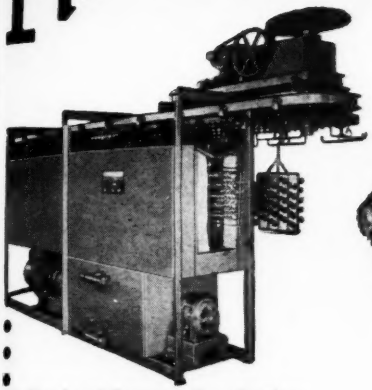
H-VW-M Sisalin Section Buffing and Polishing Wheel for preparing steel surfaces for nickel and chromium plating is described and illustrated in Bulletin SS-100 now available free from the Hanson-Van Winkle-Munning Co., Matawan, New Jersey.

"Alodine," a material for the rapid, effective, and economical protection of aluminum and the anchoring of paint, is described in a four-page technical service sheet published by the American Chemical Paint Co., Ambler, Pa. Full particulars on the Alodizing process for protecting aluminum and providing an effective base for paint are presented in the data sheet. Copy of Technical Service Data Sheet No. 7-16-100 free upon request.

Mattison Grinding and Polishing Machines. The Mattison Machine Works, Rockford, Ill., now has available a six-page circular which illustrates and describes abrasive belt grinding and polishing machines which can be furnished in a variety of combinations, depending upon the type of work to be finished. These include a hand block type grinding and polishing machine, which can also be equipped with a hand lever stroke attachment and arranged for wet grinding; a hand-lever stroke type grinding and polishing machine for all manner of flat work; and an automatic stroke grinding and polishing machine with automatic power stroke for flat grinding. Typical installations of the machines are shown and described, and specifications of the various units are presented. Copy free.

THE accompanying illustration shows the first Youngstown Kitchen wall cabinet to be conveyed through the new paint spraying booths at Mullins Manufacturing Corporation's Plant 3 at Salem, Ohio, where improvements totaling $150,000 have been recently made. The installation of new paint spraying booths and other equipment in this plant is part of the million dollar improvement program underway in Mullins' plants in Salem and Warren, Ohio.

METALWASH



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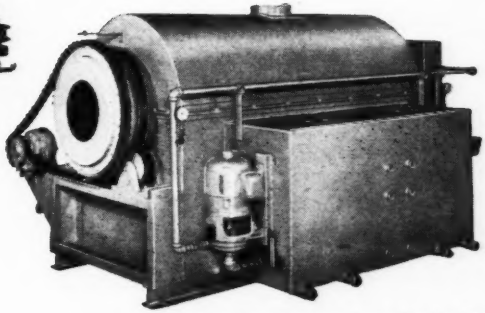

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Plating of Die Castings

Including Buffing, Cleaning, Plating and Stripping

A paper presented before the American Electroplaters' Society concerned largely with plated die castings for Fisher Body and automotive divisions of General Motors

By C. F. NIXON

Director of Product Engineering, Fisher Body—Ternstedt Division
General Motors Corporation, Detroit, Michigan

IT IS interesting to note that since the beginning of what we now understand to be the zinc base die casting industry, in about 1917, considerably more than half of all die castings made have gone to the automotive industry. In 1925, Marc Stern—in an article entitled "Die Castings in the Automobile Industry" published in the magazine "Foundry"—estimated that 75 per cent of all die castings were used on automobiles. In August 1946, the United States Bureau of Mines indicates that 17,191 tons of high purity zinc were used for zinc base die casting alloys. Of this tonnage, about ¾, it is estimated, finds automotive application. Of the die castings used on automobiles, about ¾ are chromium plated—and of the die castings used on automobiles which are chromium plated, about ¾ are used on the outside of the car.[1]

Having in mind that very few plated zinc base die castings are used where they are subjected to out-of-door exposure except on automobiles, it may be said that about a third of all zinc die castings are used in this manner.

In the late twenties, when the introduction of chromium plate so greatly improved the appearance of plated parts, particularly those used on the outside of the car, the use of plated parts for trim increased. At the same time, attention was focused on failures due to rusting or to corrosion. The importance of plate thickness with respect to durability was soon recognized. In 1926 the General Motors Class A specification for nickel plated steel parts was simply: "Nickel plated parts shall withstand 24 hours in a salt spray test without appearance of rust on significant surfaces." In 1930 the requirement that the minimum plate thickness shall be 0.001 inch minimum was added. In 1932 this same thickness requirement was extended to cover die castings.

Opportunities for the application of die casting increased with the trend toward more exterior trim. However, and it was a matter of importance, in the case of die castings, the thickness of the plated deposit could not be readily increased. The high sulfate, high pH, double salt nickel bath then used for direct nickeling of die castings practically could not be used to build deposits heavier than about 0.0003 inch. In addition, great difficulty was experienced in completely covering parts which were at all compli-

[1] Figures from R. E. Wilcox, Gerity-Michigan Die Casting Company.

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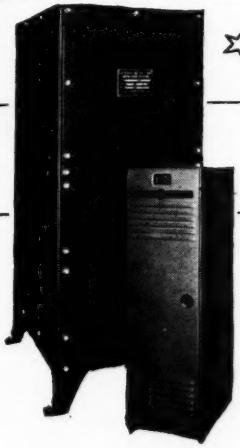

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cated in shape. These things hindered the desired development of the use of die castings, or as it sometimes happened, perplexed the plater with problems he did not have the means to solve. It was a logical and imperative development that attention should turn to copper as an undercoat, even though it was generally reported to be unsuitable, because of absorption by the zinc alloy.

References to the use of copper plate as a first deposit on zinc base die castings may be found in the literature as early as 1921. However, it is the author's opinion that copper plate was not used in production for this purpose before 1930, at which time Ternstedt plated Cadillac die-cast door handles in this manner.

The introduction of copper plate as a first deposit on die castings made it possible, first, to successfully plate die castings of complicated shape and, second, to develop total plate thicknesses sufficient to assure reasonably good performance out-of-doors. Failures due to absorption were found not to be serious at normal temperatures if a minimum of 0.0002 inch of copper is maintained for outside exposure. Even 0.0001 inch minimum for interior exposure seems quite satisfactory, based on experience over a number of years.

Because of the facility with which parts may be copper plated, the use of the copper strike has come into general use for all parts, including interior die cast hardware, even though deposits of nickel heavier than 0.0002 inch are not required for satisfactory

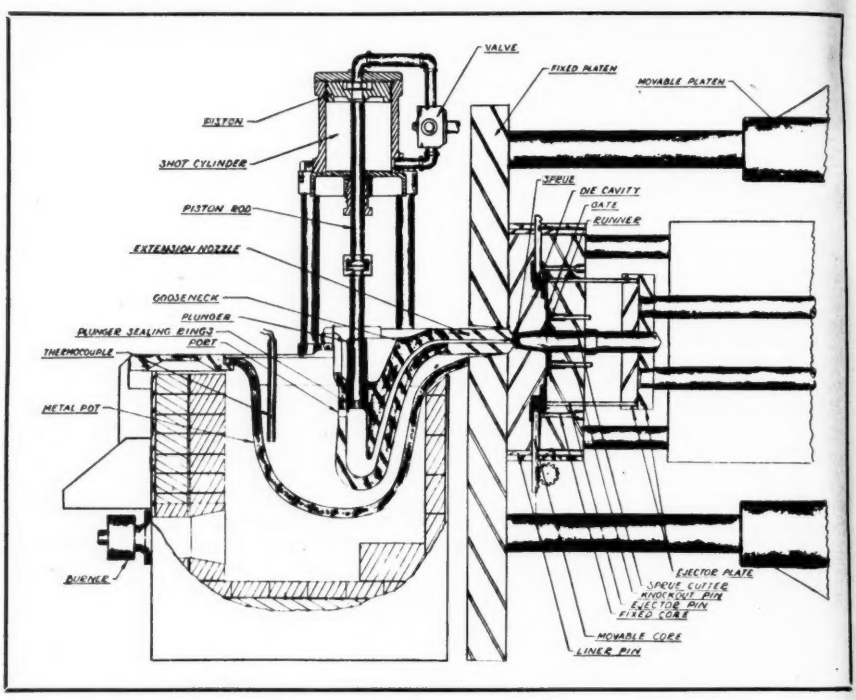
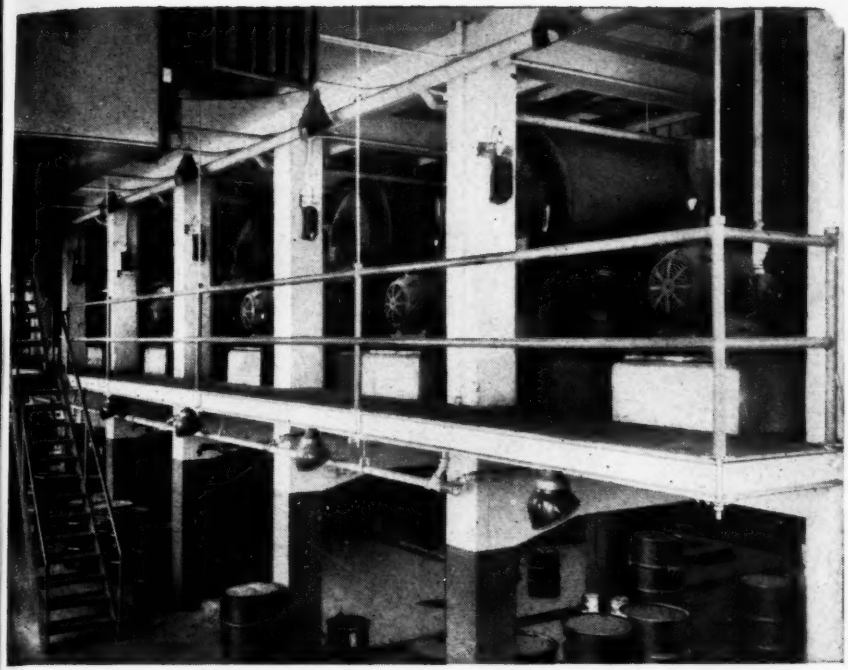


Fig. 1—Cross section of the front end of a typical die casting machine



New ball mills boost R-M output 25% . . .

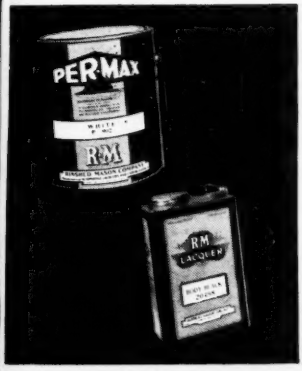


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Fig. 2—Die casting defects (upper row, left to right) shills, swirls, and cold laps; (lower row, left to right) splashes, gate holes, and soldering

corrosion resistance on such parts.

At the present time, Class A, which calls for a minimum total plate thickness of 0.001 inch—the same, it may be noted, as it was in 1932—is most generally specified and should, if properly applied, give satisfactory performance out-of-doors for a year in industrial atmospheres. This point is discussed in some detail in a paper prepared by the author and published in the November 1945 issue of "The Monthly Review."

The trend at the present time is toward heavier deposits, AA (0.0015 inch total) and AAA (0.002 inch), for still better corrosion resistance. The experience with respect to cars which have been used continuously during the war period has made us all more conscious of plating quality with respect to performance out-of-doors. At the same time we strive for improved corrosion resistance, it is continuously necessary to keep an eye on the cost of producing the desired finish.

Polishing and Buffing

Die castings as cast are die trimmed to remove them from the sprue and runner. At the same time, any flash which has appeared at the die parting

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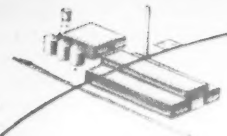

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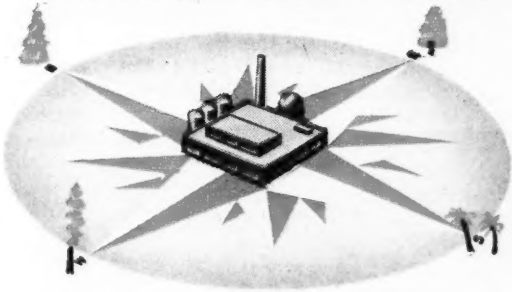

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line is also trimmed off. Following this operation, the part is polished to remove surface irregularities remaining from the trim operation and also it may be polished to remove defects in the surface of the casting. Following the polishing operation, the parts are buffed to a high luster and are then ready for plating.

In order to minimize the cost of this preparation for plating and also in the interests of the quality of the finished

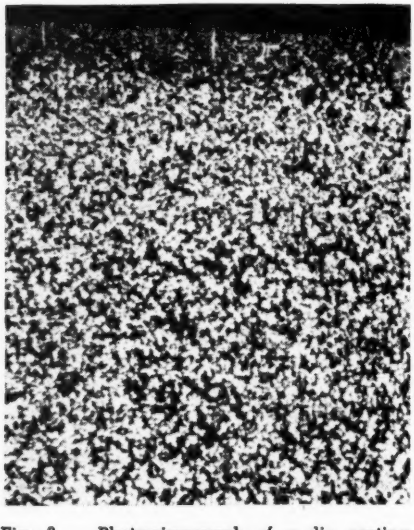

Fig. 3 — Photomicrograph of a die casting showing the thin, dense outer skin below which the metal is coarser grained and more porous

piece, the die caster strives to produce a casting free from surface imperfections. Aside from the polishing necessary to repair the surface damage done by trimming, a good die casting requires no polishing whatever. A buffing operation only should be required to prepare it for plating.

It may be desirable to enlarge somewhat on this statement. The General Motors Corporation has sponsored what is to date a series of two Joint Industry Conferences on Zinc Base Die Casting Quality which were attended by corporation representatives and representatives of the leading zinc producers and of many of the leading companies engaged in the production of die castings. These conferences were inspired, in part, by complaints that the difficulty of producing acceptable plated parts at a price was greatly increased by surface defects which required polishing to remove or minimize. The following interesting conclusions may be drawn from these conferences: First, that die casters recognize the need for smooth castings free of surface defects, and second, that while the gating of a die must be still considered an art, sufficient knowledge of the principles involved in gating as well as knowledge regarding die casting machine operation and metal control is available, so that, for most part, the finisher may with fairness demand and hope to obtain castings with smooth, sound surfaces.

Figure 1 represents the cross section of the front end of a typical die casting machine. The molten metal held in the metal holding pot enters the gooseneck through the ports. When the plunger is forced down, the ports are first sealed off by the plunger, after which the metal contained in the gooseneck is forced up through it into the sprue and through the runners and into the die cavities. When the cavities have been filled, the pressure is maintained for a few seconds until the metal in the cavity solidifies, after which time the die is opened and the complete shot (sprue, runners and castings) is removed.

The quality of the surface of the casting which so greatly influences the labor required to prepare for plating, and also the quality of the finished piece, are affected by the quality of the metal used, by its temperature, by the plunger pressure, by the speed with which the cavity is filled, by the design of the sprue and runners—gating, lo-

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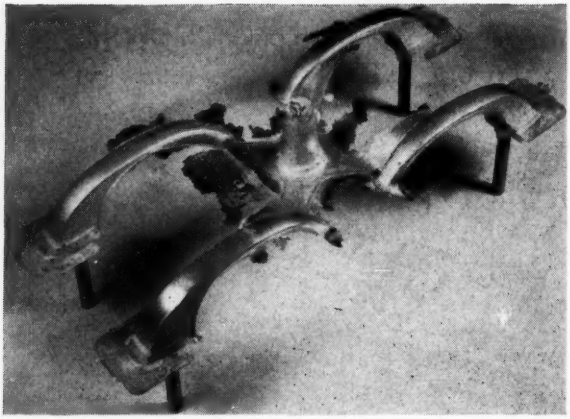

Fig. 4—Four door handles as removed from the die casting machine

cation of cavities in the die, by the surface of the die cavity, and by the temperature of the die. Without going into detail as to the specific effect of the above factors, suffice it to say that the casting defects most troublesome to platers are shills, swirls, cold laps, splashes, gate holes, and soldering (Fig. 2).

As these defects occur on significant surfaces, it is usually necessary to remove them by polishing. As is well known, die castings, by virtue of the process by which they are made, have a thin, dense outer skin below which the metal is coarser grained and more porous (Fig. 3). When polishing, carried out to remove surface defects, cuts through this skin, defects thus revealed may well be as troublesome as those for which polishing is used as a corrective measure.

Figure 4 is an illustration of four door handles as they are removed from the die casting machine, still attached by means of the runners to the central sprue. Figure 5 is an illustration of one of these handles after trimming. The irregularities at the parting line surface of this casting are typical of all die castings. Polishing is required to smooth this surface and to remove casting defects which it may be necessary to accept on other significant surfaces. After polishing, the door handle being used as an illustration is shown in Fig. 6 and after buffing in Fig. 7.

Polishing is done by means of a sheepskin wheel coated with glue and emery, usually 180 or 220 grit, or by means of an emery belt which may be driven by either a hard wheel or by a cloth buff wheel if a more flexible polishing surface is desired. Grease is applied to the wheel to prevent loading or glazing and to reduce friction, to increase the life of the abrading surface, and to improve the quality of the ground surface.

Buffing is done on cloth wheels 10 to 14 inches in diameter sewed as the nature of the particular job demands—which is usually determined by experiment or experience with previous similar jobs. A tripoli compound is used. Wherever possible, automatic equipment (Fig. 8) is used in preference to hand polishing or buffing.

Cleaning

The cleaning of parts before plating is undoubtedly the most difficult thing the plater has to do. Dr. O. P. Watts, now retired, of the University of Wisconsin, used to tell his students in electroplating that plating was 90 per cent cleaning. He did not have zinc base die castings in mind but not many platers will dispute his figure even now, unless it be for the purpose of making it higher.

Buffed die castings, particularly those which have been automatically

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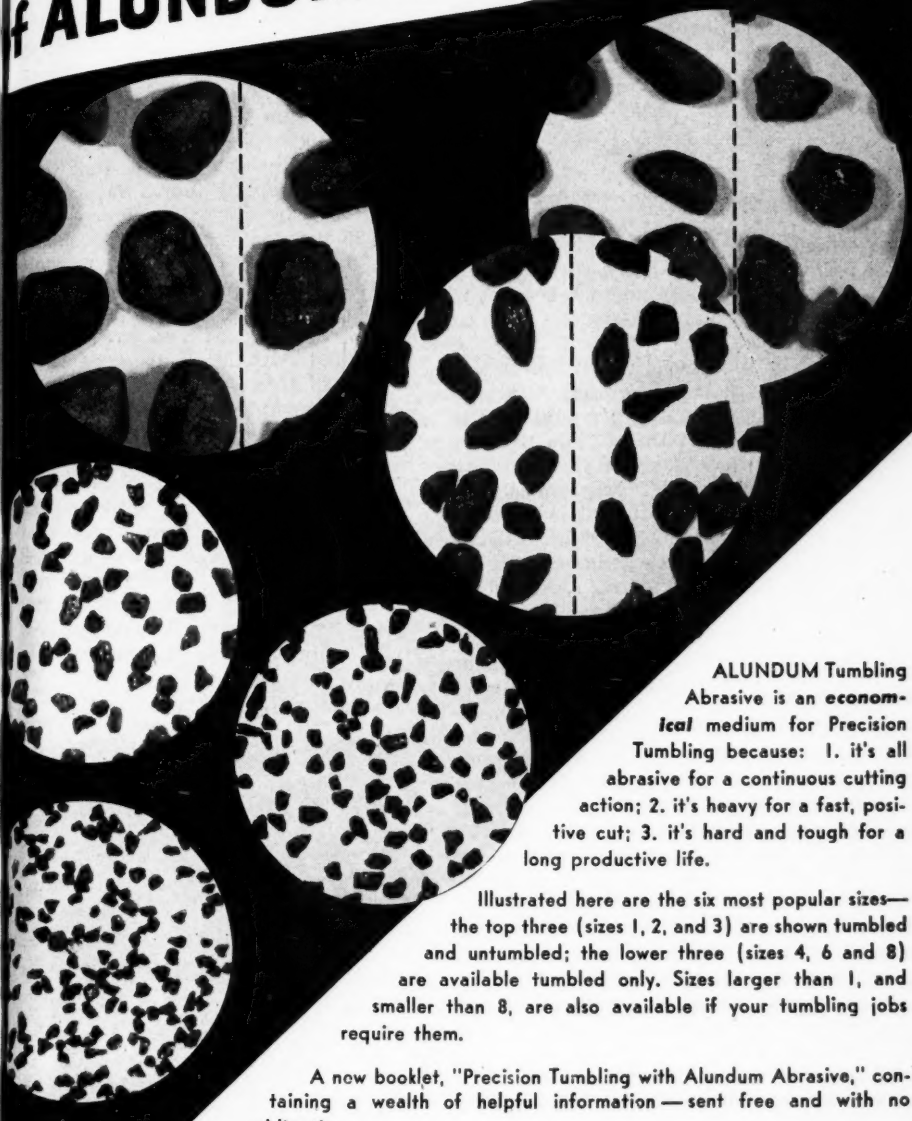

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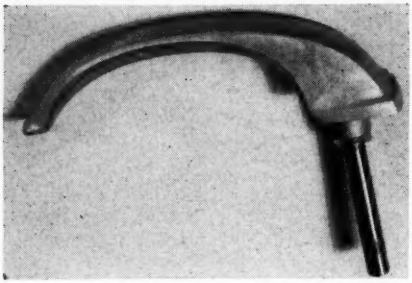


Fig. 5—Door handle after trimming

buffed, are sometimes very dirty. Buffing compound has a way of filling cavities and recesses which is troublesome to the plater. All such soil must be removed with minimum chemical action on the die casting, if subsequent plating is to be successful. Anderson and Reinhard, in a paper published in the March 1940 issue of "The Monthly Review" titled "Alkaline Cleaning and Copper Blistering," emphasized the fact that a copper deposit is prone to blistering when applied to die castings that have been exposed over-long in an alkaline cleaning solution or exposed in a strong cleaner.

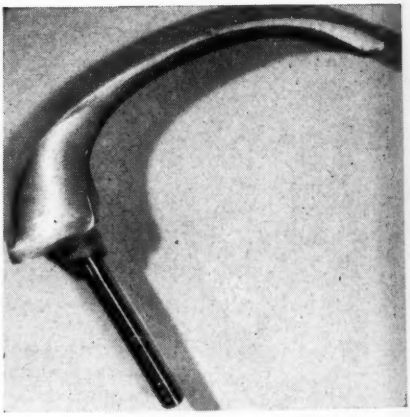
In order to remove this soil with no chemical effect, the first step in our cleaning process is trichlorethylene degreasing. A so-called three phase degreaser, which combines vapor degreasing with hot trichlorethylene spraying, serves to remove all or most all the foreign material from the part. The equipment used is the monorail type. Wherever possible, parts are placed on plating racks before degreasing to minimize handling.

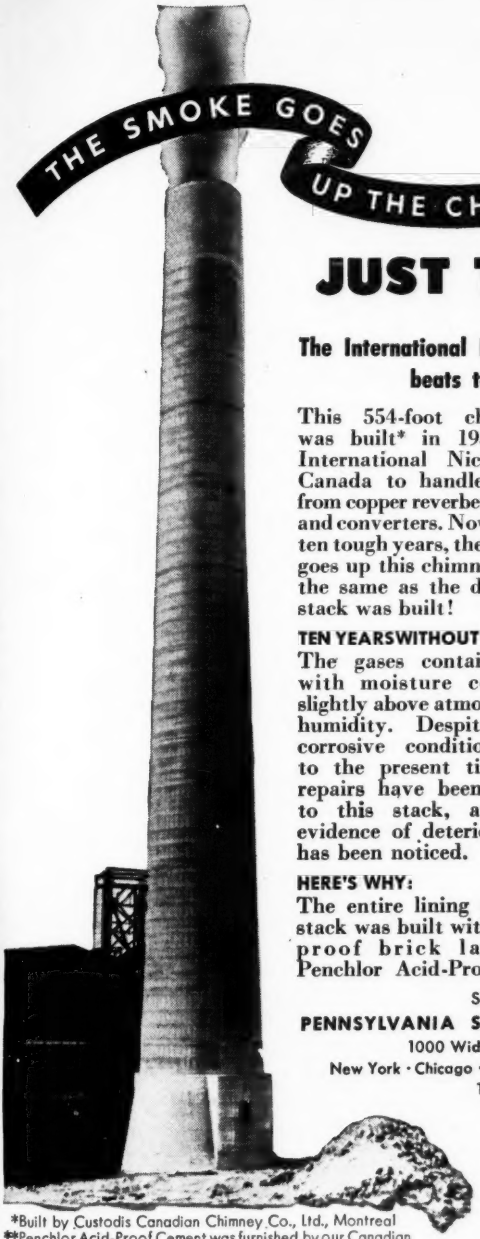
The degreaser may be relied upon to remove the polishing compound binder completely (unless it be in some very tightly packed crevice) but occasionally some of the solids of the buffing compound will remain on the work. This must be removed by hand brushing; the brief alkaline cleaning which follows will not take it off.

The balance of the cleaning and plating cycle may be carried out using still tanks, or, given sufficient volume of production, automatic plating equipment may be used. In either case the sequence of operations is essentially the same, although in some cases it may be necessary to modify conditions in various tanks to accommodate the process to the time cycle of an existing plating machine.

The alkaline cleaning is done in a solution containing 2 or 3 ounces of a cleaner made up of 55 per cent soda ash, 25 per cent trisodium phosphate and 20 per cent of sodium hydroxide. This is one of the G.M. specification cleaners. The temperature is approximately 200 deg. F. The work is the anode and the voltage from anode to cathode is about 6 volts. This cleaner would serve its purpose, when fresh, used as a direct cleaner. Reverse cleaning is preferred, however, because the effects of contamination with chromium salts and with zinc and copper salts are less. It is not felt that the formulation of the cleaner given is critical. Undoubtedly, it could be varied within quite wide limits and still do a satisfactory job. Because of possible contamination, as referred to

Fig. 6—Door handle after polishing





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above, this particular cleaner is renewed frequently.

Strictly speaking, perhaps the operation just described is not as much a cleaning operation as it is a chemical treatment operation. The work, as it enters this cleaner, has been degreased and usually looks to be quite clean, however,work taken directly from the degreaser to the copper strike tank will fail due to the poor adhesion of the copper deposit.

Following this alkaline cleaning, the work is rinsed in cold water, and im-

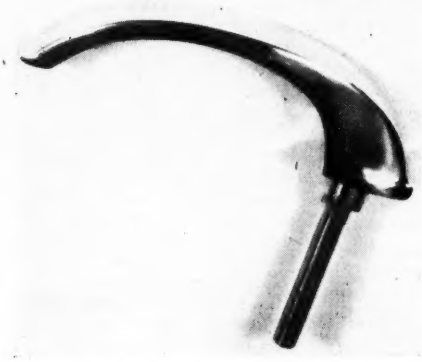

Fig. 7—Door handle after buffing

mersed for 20 or 30 seconds in a 1½ per cent sulphuric acid dip. Following the acid dip, the work is again rinsed and is ready for the copper cyanide deposit.

At various times, other acids than sulphuric have been used successfully. There are some advantages to using a weak hydrofluoric acid dip but they are not sufficient in our opinion to offset the hazards involved in the handling of concentrated hydrofluoric acid incident to the making up of the dip.

There is an important relationship between the strength of the acid dip and the strength of the alkaline cleaning. If it is necessary to use a stronger cleaner or to clean for a longer period of time, then it seems to be necessary to increase the strength and the time of acid dipping. However, in general, it seems safe to say that both the cleaner and the acid should be as weak and as of short a duration as possible. For a particular set of circumstances, it will be necessary to establish concentrations and times by experiment. When the sequence of cleaning and acid dipping given above is used, the die casting is but slightly more gray in appearance as it comes from the acid dip than it was when it went into the cleaner.

The copper strike solution contains 2½ to 3 ounces of copper cyanide and ¾ of an ounce to one ounce of free cyanide. In addition, one ounce of sodium hydroxide and from 4 to 6 ounces of Rochelle salts per gallon are added to maintain anode corrosion. The solution temperature is maintained at 110 to 115 deg. F. Some steel anodes are used along with the copper anodes in sufficient quantity to prevent a build-up of copper concentration. It is important that the copper content be kept within the limits prescribed in order to secure a sufficiently bright or smooth deposit. Under these operating conditions, the sodium carbonate content will not build up to excessive concentrations. The sodium carbonate content should be kept less than 15 ounces per gallon. The current density usually employed is between 20 and 30 amperes per square foot. The time of plating in the cyanide bath may run from 5 minutes to 10 minutes. It is not considered desirable to attempt to build much more than 0.0002 inch of copper plate thickness in this bath if bright deposits are to be used over it, without buffing.

Following the completion of the copper strike operation, the desired thickness of deposit in copper or in nickel or in both may be built as for any other base metal. In order to reduce cost, there is an increasing tendency

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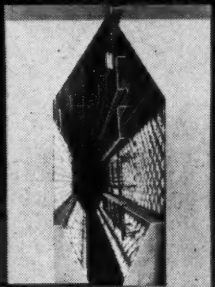

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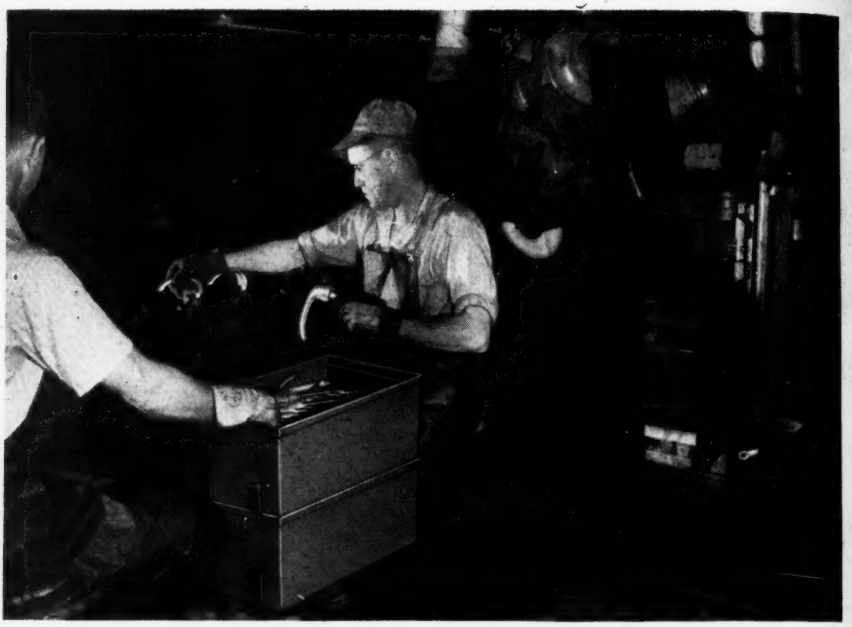


Fig. 8—Automatic buffing of door handles

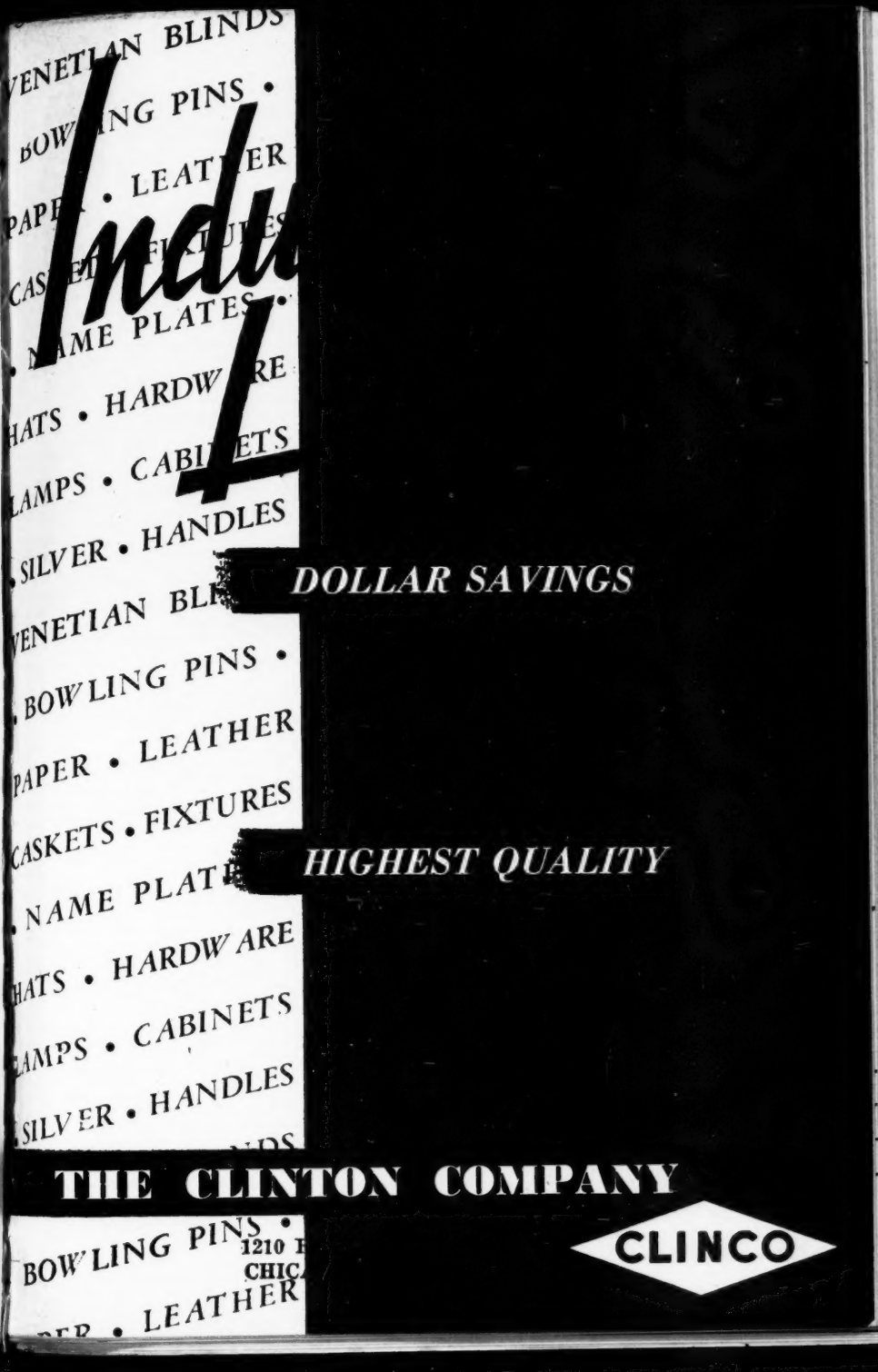
to use bright copper deposits and bright nickel deposits followed by chromium plate without buffing operations on either the copper or the nickel. This obviously is not essential to the production of a satisfactorily plated die casting but such a procedure does eliminate the hazard of cut-throughs as a result of buffing, and, of course, does hold down cost.

When parts are carried from one plating operation to the next without an intermediate buffing operation, the parts are not ordinarily unracked until after chrome plating. Under these conditions, even though the greatest of care be exercised, it is not always possible to prevent contamination of cleaning solutions with chromium, as referred to above.

It is desirable, before racks are used again, to strip them anodically in a sodium carbonate solution to remove as much of the residual chromic acid and chromium as possible.

Stripping

There is no altogether satisfactory method known for the stripping of heavy deposits made up of copper and nickel from die castings. The best method for stripping such parts known to the author is the sulphuric acid strip. As a result of considerable experimental work, a concentration of 50 to 55 per cent was settled upon as being best. The stripping action was reasonably rapid on both the nickel and the copper, while the attack on the die casting was not ordinarily excessive. The temperature recommended is 150 deg. F., and the voltage 9 volts. If the concentration of acid is increased, the rate of attack on the copper becomes quite slow. Under these conditions, when base metal is reached in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certain portions of the piece, attack on the die casting may be severe before the balance of the copper has been removed.

Additions of glycerine have been tried but are not recommended. There is no appreciable improvement in the quality of the stripping but there is an increase from the hazard point of view, in view of the fact that glycerine causes foaming. The foam bubbles contain both hydrogen and oxygen which may be exploded by a spark. Such an explosion may splash acid. Many other additional agents have been tried, such as mannitol, ethylene glycol, and formic acid, without finding one which contributes significantly to the performance of straight sulphuric acid.

There are other means available for the removal of copper only which are satisfactory but are not applicable when the copper has been nickel plated. Immersion in a polysulphide bath or anodic treatment in a sodium cyanide sodium sulphide bath will serve this purpose among others.

"pH Tables for Electroplaters" is the title of a four-page folder issued by R. P. Cargille, 118 Liberty St., New York 6, N. Y. The folder provides a comprehensive tabulation of plating baths, listing the permissible pH range with the optimum pH for each bath. References to original articles are cited for each process, and information is presented regarding how photocopies of these articles may be obtained. Copy free upon request.

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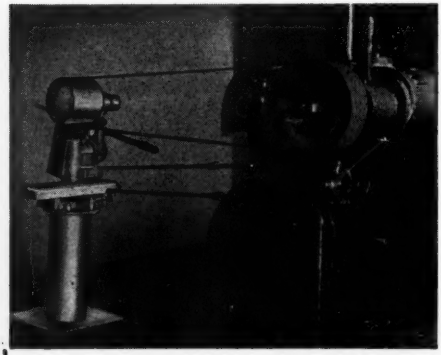

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Electrolytic Methods for Purification of Nickel Plating Baths

AMONG the topics discussed at the 34th Annual Convention of the American Electroplaters' Society in Detroit of interest to metal finishers concerned with the production of high quality bright nickel plated products was the presentation by B. C. Case, Hanson-Van Winkle-Munning Company, of practical methods for the electrolytic purification of bright nickel plating baths. The description was given as a part of a paper on the general subject, "Modern Applications of Electroplating Solution Purification," which was awarded the A.E.S. Dorothea Proctor Award. According to information presented by Case, lead, copper, zinc, and iron are the most common metallic impurities found in nickel plating solutions. Electrodeposits meeting today's high quality requirements keep the problem of purification and control of solutions among the foremost now facing the plating industry.

Most finishing engineers familiar with bright nickel plated finishes have seen nickel deposits from plating baths containing excessive metallic impurities. The most common defect caused by metallic impurities, according to Case, is a loss of color or darkening of the nickel deposit in the low current density ranges. Black streaks, black pits, or gray deposits in all current density ranges are other noticeable effects of foreign metals. Loss of ductility of deposit is most noticeable with iron. The bent cathode or Hull Cell tests are reliable means of determining the presence of small amounts of metallic impurities.

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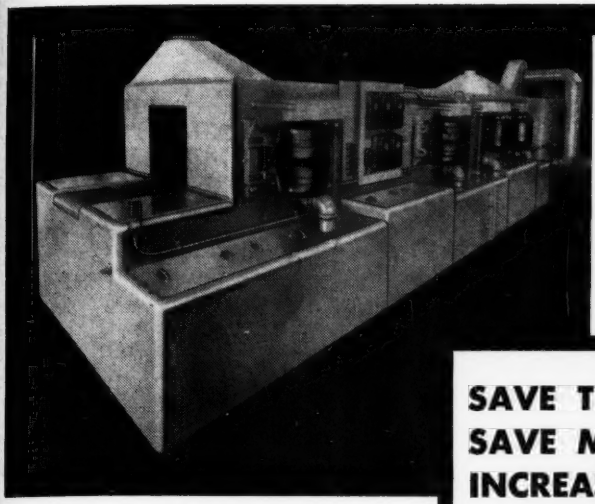

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When the maximum area of properly shaped cathodes are used, together with proper agitation and current density, rapid purification of plating baths from metallic impurities by electrolytic methods can be expected. An

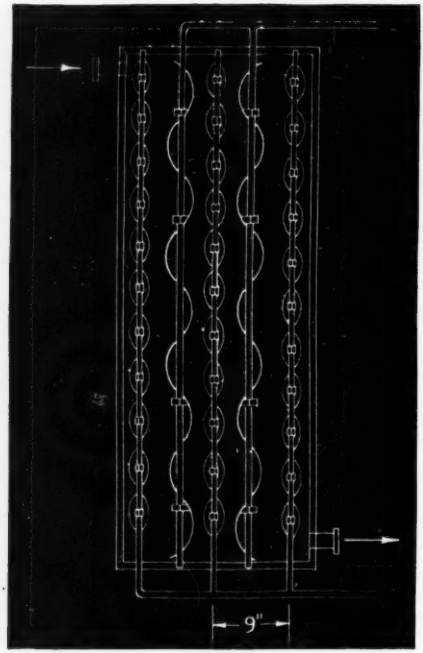

Fig. 1—Recommended arrangement of anodes and cathodes for electrolytic purification of nickel plating baths
(Drawing courtesy Hanson-Van Winkle-Munning Co.)

advantage of using the electrolytic method of purification that was brought out by Case is that the plating bath does not have to be transferred to a storage tank for treatment. Thus, according to Case, judged from all angles, the electrolytic method, properly applied, in practically all cases will provide the easiest, most economical, and fastest means of plating solution purification wherever metallic impurities are involved.

Based on data presented by Case, early research publications show that each of the four principal contaminants to be removed (lead, copper, zinc, and iron) has a set of conditions that produces the most efficient removal by co-deposition. However, the small sacrifice in the individual rates of removal are greatly overshadowed by the removal of all four of the metals at one time. The two conditions that can be varied in practice are current density and agitation. In practice, for purposes of purification, the operating pH and the operating temperature of the nickel plating solution are not changed. It is regarded as impractical, according to Case, to remove any moderate amount of the four metals by the low current density electrolytic purification method without some sort of agitation. A cathode must be used which provides the proper current density ranges for the combination of metal impurities present. Copper and lead are known to plate out very satisfactorily at about 2 to 4 amp./sq. ft., with zinc and iron coming out better at 6 to 7 amp./sq. ft. By using a cathode having symmetrical variations in recesses and high points and using an overall current density of 5 amp./sq. ft., the proper current density for all four metals can be obtained.

Practice has shown, according to Case, that the ordinary corrugated black iron sheets are one of the most satisfactory types of cathodes for the method of purification involving the simultaneous removal of all the four above named metals. Thus, when an overall current density of 5 amp./sq. ft. is applied to this corrugated type of cathode, the copper and lead deposit out on the recessed areas, and the zinc and iron will deposit out on the high points. Under these conditions, all four metals will plate out simultaneously with nickel. Thus, in specific installations having only one or two of the four metals as principal impurities,

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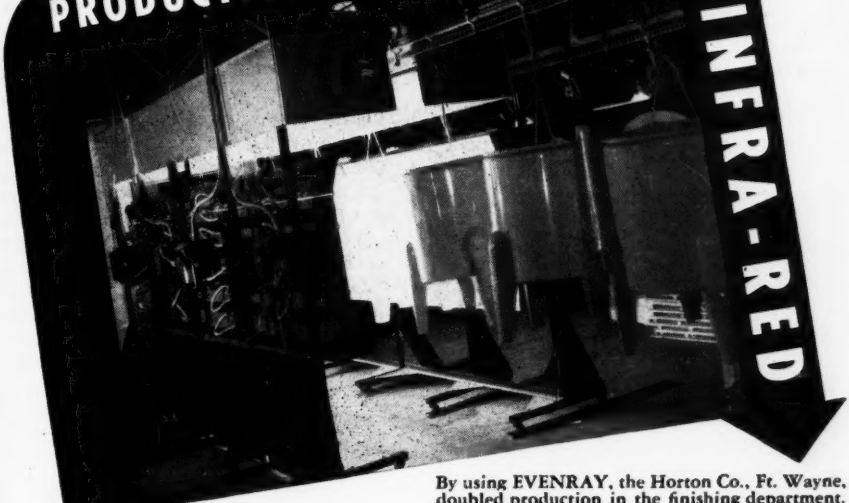

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it can be seen that the design of the cathode may be changed slightly to suit the optimum conditions for those particular metallic impurities. A greater or lesser depth of corrugation may be used, as required.

One of the points emphasized by Case was the importance of using sufficient cathode area in the purification process. Obviously, it takes ampere minutes or ampere hours to remove a certain con-

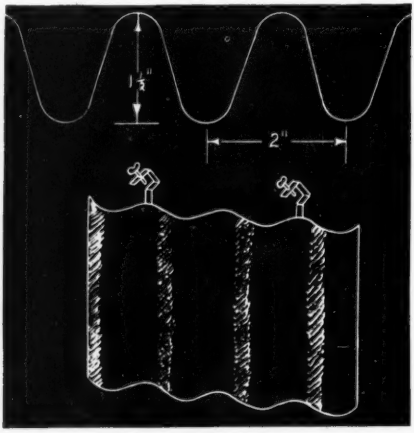

Fig. 2—Design of purification cathode made from corrugated black steel sheet
(Drawing courtesy Hanson-Van Winkle-Munning Co.)

centration of metallic impurities. Thus, since the proper current density has been found to be 5 amp./sq. ft., when used with the proper shaped cathode, it becomes evident that the only way to speed up the removal of the metallic impurities is to increase the number of square feet of cathode area, with a proportionate increase in the current drawn. The progress of the purification treatment can be judged by the observation of the deposit on the dummy cathodes. When black or dark deposits have disappeared and the color or brightness approaches that obtained at normal current densities from a clean bath, it can be assumed that the impurities have been reduced to a good operating level. According to Case, it is the practice in many plating plants to regularly put a full set of dummy cathodes in the nickel plating solution at lunch time or other normal shutdown periods. This practice has, in many cases, eliminated the necessity of shutting down production for extended purification at intervals.

Shown in Fig. 1 is a recommended arrangement of anodes and cathodes for the electrolytic purification of nickel plating baths. The inlet of the purification tank should be at the top or bottom, in one end, and the outlet at the opposite end, and at the opposite level, top or bottom, from the inlet. This arrangement effects a solution movement past the cathodes from end to end and from top to bottom, or vice versa, as the case may be. By this design, maximum contact and agitation between the solution and purification cathodes are obtained. Thus, with this arrangement of cathodes and anodes, it was pointed out by Case that the vitally important cathode current density is quite uniform throughout the bath. Figure 2 shows a design of purification cathode made from ordinary corrugated black steel sheet. The approximate dimensions of the depth of the corrugations and the spacing of the corrugations are shown. A type of positive contact is also illustrated.

As the working knowledge of purifying plating solutions developed and the needs to be fulfilled were understood more thoroughly, it was a logical step from batch purification to continuous purification methods, wherever feasible. According to Case, the amount of continuous electrolytic purification per gallon of solution required to ensure a sufficiently clean plating bath was arrived at by recording the time of each purification and the frequency of these treatments on several bright nickel installations where the produc-

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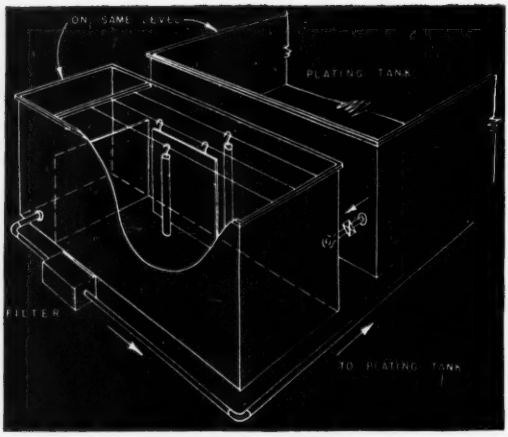

Fig. 4—Design of solution purification equipment recommended for use in new plating installations (*Drawing courtesy Hanson-Van Winkle-Munning Co.*)

tion conditions were fairly well known. After completing such studies, it was developed that if the purification tank was designed so that 0.05 amp. hr./gal. of solution per hour of operation was provided, the worst cases of metallic contamination could be kept under control. On this basis a 1,000-gallon bright nickel solution would require 1,000 x 0.05 equals 50 amperes flowing in the purification tank. Thus, the recommendation of a current density of 5 amp./sq. ft. means that the tank should contain 10 square feet of properly shaped cathodes. It was also established that if the rate of flow through the purification tank was from ⅓ to ½ of the total plating solution per hour, the system would then keep the plating bath free from harmful concentrations of metallic impurities.

Numerous designs of continuous purification tanks have been developed and used with existing equipment or in conjunction with new equipment. Shown in Fig. 3 is a purification tank designed for use with existing still plating tanks, semi-automatic or full-automatic installations. This design does not require openings in the plating tank proper. A separate pump or the filter may be used as a means of circulation. A valve is placed between the pump and the purification tank to prevent a backflow of solution during shutdown. The solution enters the purification tank at the bottom, in one end, and its path is upward and across the purification tank to the large outlet, as shown. The solution is returned to the plating tank by gravity. The size of this return pipe or hose should be sufficiently large to handle the highest rate of flow from the filter or pump. If the overflow is not sufficiently

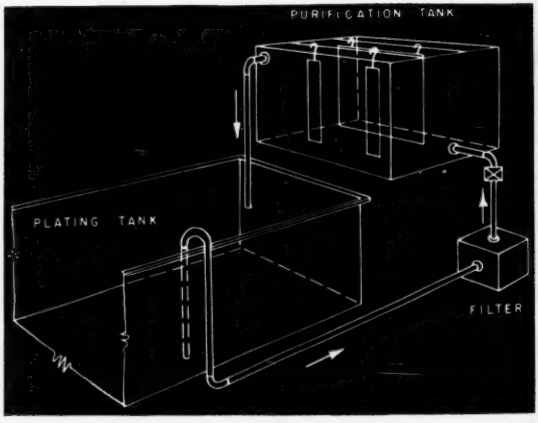

Fig. 3—Type of purification system designed for use with existing still plating tanks, semi-automatic or full-automatic installations (*Drawing courtesy Hanson-Van Winkle-Munning Co.*)

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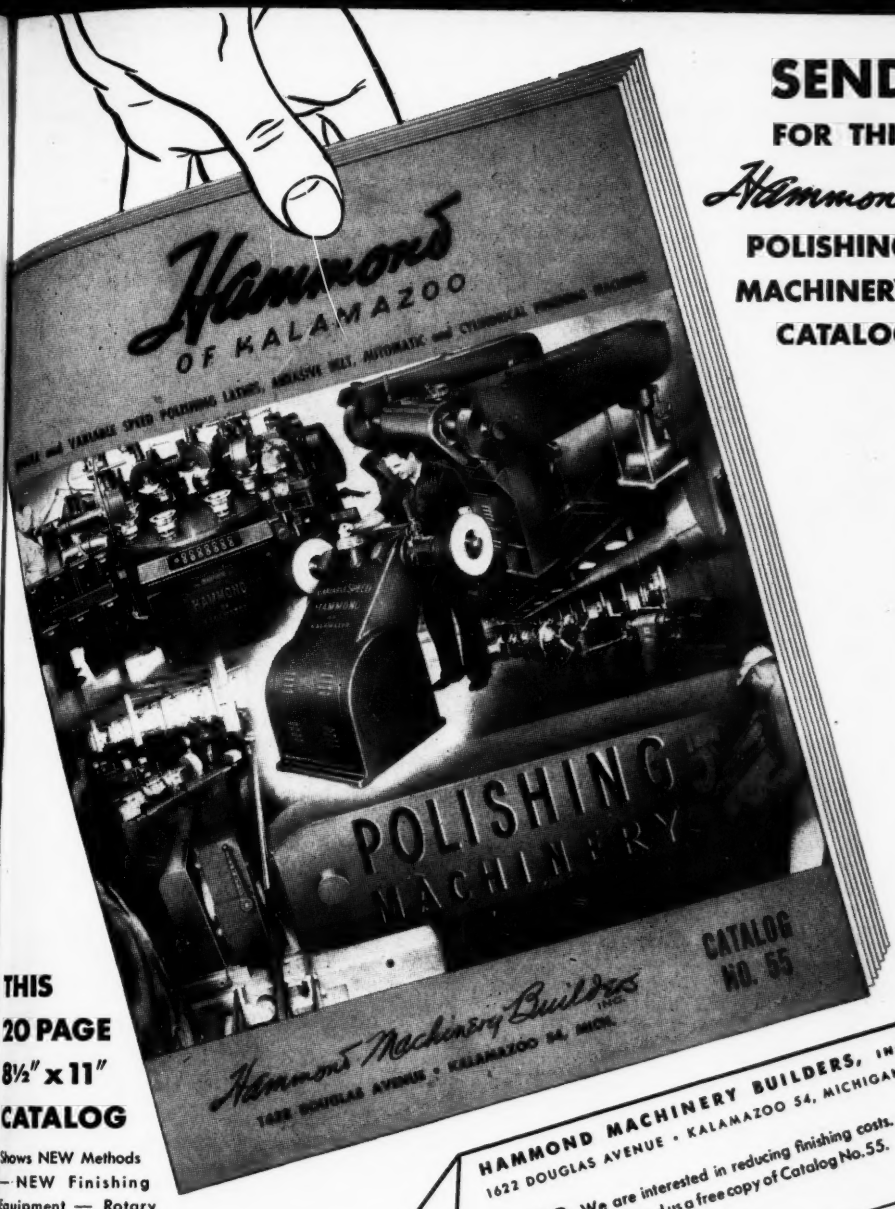

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large, trouble will be experienced from overflowing of the purification tank.

Shown in Fig. 4 is a design of solution purification equipment recommended by Case for use in new plating installations. It can be noted that the purification tank is placed on the same level as the plating tank. A large connecting pipe or hose, with a valve between the purification tank and the plating tank, serves as the inlet to the purification tank. Solution flow through this large diameter connecting pipe is by gravity, the size of the pipe being sufficient to produce the proper rate of flow. For most efficient operation of this type of equipment, it was brought out that only a one or two-inch head between the two solution levels should be employed, and, if the connecting pipe is of the proper size, this small head is sufficient to produce the proper flow. It was pointed out that too small a hose will result in having the purification tank only partly filled. The solution flows past the purification cathodes and over the false end or weir, and is then withdrawn into the suction of the filter. This type of purification system also serves as an ideally suited place for making additions to the bath since the dissolved additions receive electrolytic purification and filtration, with or without carbon treatment, before returning to the plating tank.

One note of caution was brought out by Case in his presentation; namely, that the engineer in charge of the purification should be sure that positive contacts are designed for the purification cathodes. With the cathodes very close to each other in the purification unit, if the contact of one cathode becomes poorer than the adjacent one, the edges of the cathode having the better contact will become anodic to the edges of the cathode having the poorer contact, and the impure nickel deposit, or even the corrugated sheet itself, will go into solution, producing a source of metallic contamination of impurities feeding into the bath. Bolted contact hooks, or the equivalent, on the purification cathodes will prevent such a condition occurring. The many practical suggestions given by Case in his paper will certainly be of value to many production platers in maintaining purified nickel plating baths for resultant high quality deposits.

* * *

Determination of Abrasion Resistance of Organic Protective Coatings

IN the proper determination of the suitability of a protective coating many tests are employed. Some of these consist in exposure of the coating to accelerated environmental conditions, and others in physical tests on the coating. Many of these tests must be made on a comparative basis, since the testing conditions in all cases may not be reproducible, or the results may

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not lend themselves to numerical evaluation. Corrosion tests consist in the exposure of suitable specimens to various environments and determining the point at which attack upon the base metal begins or reaches a maximum

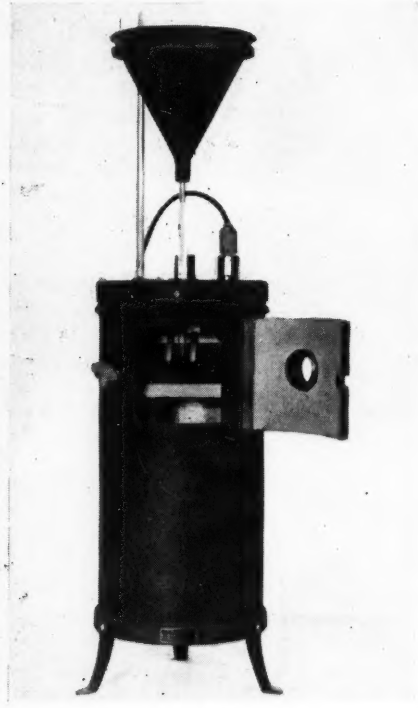

Fig. 5—Abrasiometer for determining the abrasion resistance of organic coatings
(Photo courtesy Bell Telephone Laboratories, Inc.)

allowable level. These tests usually take the form of outdoor atmospheric exposure of the specimen, immersion in sea water or chemical solution, or burial in the soil. Salt fog chambers, humidity rooms and cabinets, and weathering machines are widely employed in conducting the accelerated types of tests. Frequently, it has been found desirable to vary the thickness and combination of coatings as a means of readily determining rates of deterioration.

Valuable information on the strength of organic coatings, when examined as attached coatings, is obtained by measurement of their resistance to abrasion under suitable test conditions. A satisfactory apparatus for the determination of the abrasion resistance of organic coatings was described before the Third Annual Symposium on "Modern Metal Protection" at Cleveland, Ohio, by K. G. Compton of the Bell Telephone Laboratories, Inc. In apparatus of this type, a coated specimen is subjected to the cutting action of many fine abrasive particles impelled at a controlled velocity against the organic coating surface. In the test apparatus, shown in Fig. 5, the test panel is mounted in the unit on a stage which is set at 45 degrees to the vertical tube of a nozzle. The nozzle is then brought down in contact with the panel. In the test, the film of organic coating is worn away at a spot directly under the exit end of the nozzle by a controlled blast of carborundum. The abrasive value is a summation of the work done by these particles in pulling the film apart. A means is thereby provided for estimating the effective tensile strength of an anchored coating.

However, it was pointed out by Compton in his description of the test apparatus that in his impingement type of test, soft rubbery materials may provide large values of abrasion resistance because the abrasive particles bounce off the surface of the specimens. This illustrates one point that must be kept in mind in the testing of all organic coatings; that is, the necessity of integrating the knowledge obtained from one test with that obtained from other tests. The correlation of knowledge from many physical and chemical tests is essential to the selection of a balanced finish for a

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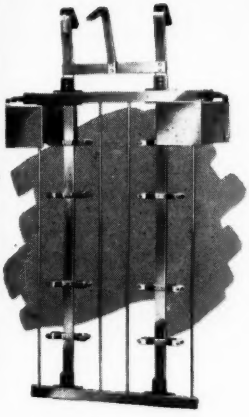

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product wherein desirable properties in one direction are not sacrificed to the extreme of other properties. Thus, in the case of the impingment type of test, unless the organic coating film tested is shown to be tough by other tests, the abrasion resistance value obtained may be meaningless or may merely indicate, in some cases, an incomplete cure of the coating.

* * *

Relative Corrosion Resistance of Cast Iron and Steel

IRON castings form the bases and frames of much industrial machinery. In some instances there has been the desire to replace certain cast iron parts with steel to obtain structural and economic advantages. The question naturally arises as to how cast iron and steel compare in corrosion resistance. Studies have recently been carried out by the Westinghouse Electric Corporation which contradict the longstanding empirical assumption that iron is more corrosion resistant than steel. These tests prove that while bare steel and cast iron are equally resistant to corrosion, surfaces of steel given a properly applied, standard, motor paint finishing treatment are more resistant than cast iron given the same treatment. The results of the studies were reported by R. W. White of the Materials Engineering Section of Westinghouse, and were initiated because of plans to use steel in place of cast iron in certain construction parts of electric motors (see also "Materials and Methods," August 1947).

The erroneous belief in the superior corrosion resistance of cast iron has been perpetuated by the fact that thin cross-sections of steel, when substituted for heavy castings, rusted through faster. Account was not taken of the large difference in cross-sectional thickness. Only recently has the accumulated evidence of investigators

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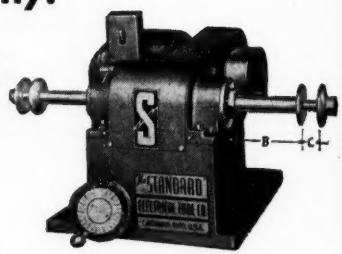

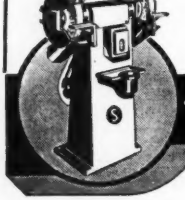

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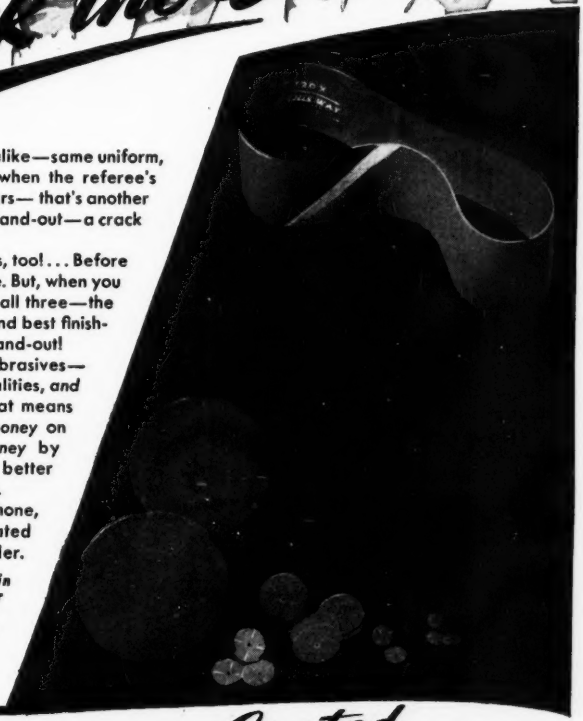

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shown that the various external environmental conditions to which steel or cast iron parts are subjected, rather than the difference in composition, are the governing factors in corrosion.

The test results indicated that if the metal is not finished with an organic coating, steel has rust resistance comparable to cast iron of equal thickness. In the Westinghouse study, the results obtained when steel and cast iron panels were finished with organic coatings of the same thickness and exposed to the test conditions showed the superior corrosion resistance of the steel. The cast iron rusted at a faster rate than the steel because the roughness of the sandblasted surface results in high and low spots. When coated with lacquer or enamel, the liquid fills in the low areas first, and the film shrinks down over the high points as the solvent evaporates. A thinner film at these points, and consequently less protection for the metal, results. Once it is formed, rust collects moisture and more rust is formed. This rust tends to spread under the paint film. Rolled steel, on the other hand, is relatively smooth, and a comparable volume of lacquer or enamel covers uniformly, providing greater overall protection to the metal.

* * *

Importance of Mixing Room Control in Organic Finishing

MIXING room control in the finishing department should be such as to ensure uninterrupted production schedules and to prevent shutdowns due to dirt in materials with consequent spray gun troubles, rough finishes resulting from improper viscosities, or other difficulties brought on by using wrong thinners, thus tending to produce excessive orange peel or improper drying and possibly causing a quick breakdown of the finish. In the successful use of finishes, there are two important factors that are sometimes slighted; namely, care in storing and preparation of use. Correct methods can be established easily and will aid greatly toward an efficient finishing department. In general, one good practice is to mark all containers of finishing materials with the date on which they are received and use the oldest material first.

Organic finishing materials should be sampled and tested when received from the supplier. If the materials are not tested until the user is ready to apply them, there is always the possibility that the finisher will find himself with only unsatisfactory material on hand, thereby causing unnecessary production delays. Samples should be taken from each of the manufacturer's batches after thorough agitation of the material. To some extent, the number and kind of tests applied to the material will depend on the uniformity of the previous shipments,

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the kind of material, the purpose for which it is to be used, and the effect possible variations in the finishing material will have on the finished product. A finishing material to provide maximum protection and appearance should be examined sufficiently to determine that its weight and consistency are up to standard, its use will not cause production difficulties, and that the film produced is satisfactory for the intended purpose.

The high quality finishing materials should be examined critically, since maximum durability and appearance for sales appeal are very important. The examination of the shipment begins with the taking of the sample. A convenient method for taking a sample from a drum is to use a clean glass or metal tube approximately ⅝ to ½ inch in internal diameter and about 24 inches long. To take the sample, the tube is grasped in the hand and the thumb placed over one end while the other end is inserted into the material through an open bung hole. The thumb is released, allowing the liquid to flow up into the tube, then replaced while the tube is withdrawn, and again released to allow the liquid to flow into the sample container. The operation is repeated until sufficient material for the sample is obtained.

The man in charge of mixing and testing of materials should be instructed in the proper care of his equipment, why viscosities must be maintained, and, where he has several manufacturers' materials in use, how necessary it is that he use the thinner corresponding to the material being mixed. One definite advantage of testing materials before their use and in careful mixing room control, other than the obvious reason, is that the information obtained is of great assistance in diagnosing the troubles in production which occur in every finishing department. Thus, with a reasonable assur-

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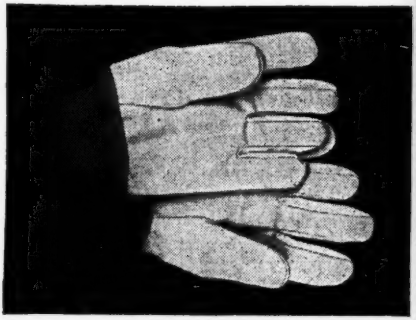

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Density	Recommended Usage
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Medium	For polishing and slight stock removal
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The design features of PRESTO Contact Wheels make these results possible. The tough synthetic rubber, furnished in four degrees of density, provides correct conformation for the most effective polishing.

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The rubber is vulcanized to the metal core. Each wheel is tested at 5600 rpm before shipment.

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ance that the finishing materials were supplied in satisfactory condition, immediate attention can be given to the things which may have gone wrong in the preparation of parts to be finished, the method of application, or baking operations.

* * *

New Uses for Silicone Products

THE elimination of pigment floating or streaking in paints that have more than one pigment color, the reduction of "orange peel" in sprayed lacquers and enamels, and the prevention of foaming in water paints were among the important new uses claimed for silicone products by James R. Patterson of General Electric's Resin and Insulation Division at a meeting of the Pacific Chemical Exposition held recently in San Francisco. According to Patterson, silicone resins will withstand an exposure to 500 deg. F. for several hundred hours without appreciable color change or loss of gloss; enamels remain flexible at a temperature of minus 60 deg. F. and will endure long immersion in boiling water, as well as dilute mineral acids and alkalis.

Patterson further stated that silicones blended with other film-forming materials closely approach straight silicones in heat resistance and show little deterioration after long exposure to temperatures up to 500 deg. F. He also stated that the use of a very small quantity of silicone oils, paints, and enamels would restore badly flocculated paints to an acceptable condition.

Silicone resins may be pigmented in the usual ways since they wet pigments very well, are good dispersing media, are soluble in low-cost hydrocarbon solvents, and the resulting solutions are low in viscosity. Since there is little or no vehicle color to encounter with silicone resins, unusually bright colors and clean tints will result, Patterson claimed.

Continuing his discussion, Patterson stated that the baking temperatures required for silicone resins have been brought down to practical levels by resin design and catalysts. Above 175 deg. C. polymerization and curing are said to proceed rapidly and highly resistant films to be produced. The average time required for curing films at 350 deg. F. is approximately one hour, however, at 500 deg. F. 10 to 15 minutes are claimed to be sufficient.

Discussing the use of silicones in blends with other film-forming materials, Patterson explained how one class of these products containing a minor portion of either silicone resin or oil showed improved low-temperature flexibility and provided maximum water and chemical resistance. Another class is the reverse type in which the content of the silicone predominates. Here the other film formers are added either as extenders for economy or as agents to improve such properties as adhesion, curing rate, hardness,

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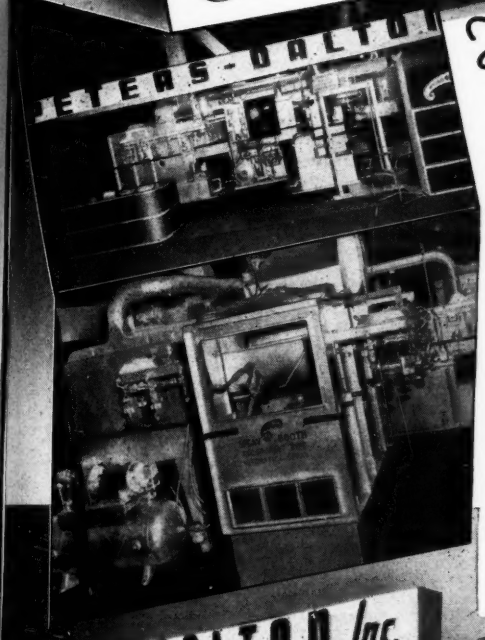

FOR the first time in National Metal Show history, or any other industrial exposition, a **COMPLETE OPERATING ORGANIC FINISHING SYSTEM** was on display . . . Many thousands gained first-hand knowledge of Peters-Dalton's outstanding design, maintenance, operating and construction features for

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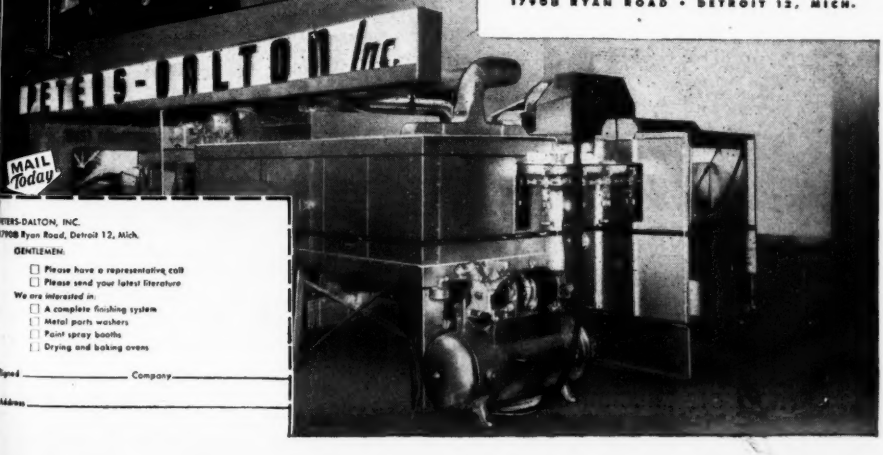

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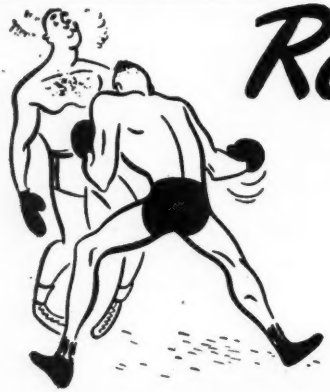
and solvent resistance. According to Patterson, some polymers are compatible in all proportions which make them useful in both of these mixture types. These include the urea formaldehyde, ethyl cellulose, and some acrylic resins. There are other polymers which in general are not compatible with silicones unless they are combined by co-condensation during the process of manufacture.

Dearborn Buffs and Polishing Wheels are illustrated and described in a four-page folder published by the Dearborn Industrial Manufacturing Co., Inc., 5049 Ogden Ave., Chicago 49, Ill. The folder provides data on deluxe bleached buffs, deluxe unbleached buffs, deluxe fancy colored buffs, full disc buffs, bleached buffs, unbleached buffs, Wonder Cut bias type buffs, folded buffs or pocket buffs, and jewelers buffs, as well as full disc unbleached wheels, sheepskin wheels, contact wheels, and other polishing and buffing wheels. Copy free upon request.

Amercoat Plastic Coatings. A 12-page catalog presenting complete details on the chemical and physical properties, application instructions, and other pertinent data on protective coatings is announced by the Amercoat Division, American Pipe & Construction Co., P. O. Box 3428, Terminal Annex, Los Angeles 54, Calif. Copy free upon request.

"Woven Wire Conveyor Belts for Industrial Applications." The Cambridge Wire Cloth Co., Cambridge, Md., announces the publication of a 56-page booklet consisting of a series of articles on "Woven Wire Conveyor Belts for Industrial Applications." Subjects treated are as follows: (1) Metals and Alloys Used in Conveyor Belt Construction; (2) Types of Conveyor Belt Construction; (3) High Temperature Conveyor Belts; (4) Woven Wire Conveyor Designs; (5) Installation and Operation of Woven Wire Conveyor Belting; and (6) Application of Woven Wire Conveyor Belting.

Copy of the booklet is available free to interested mechanical executives upon request.



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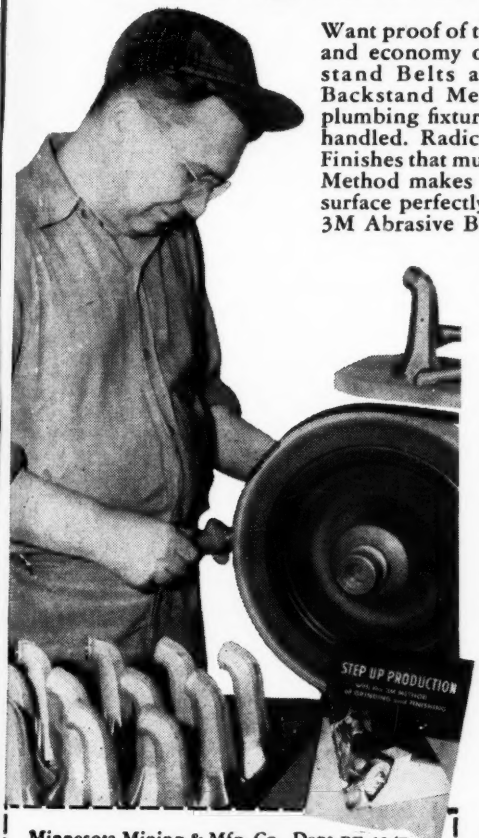

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PRACTICAL APPLICATIONS of Modern Products

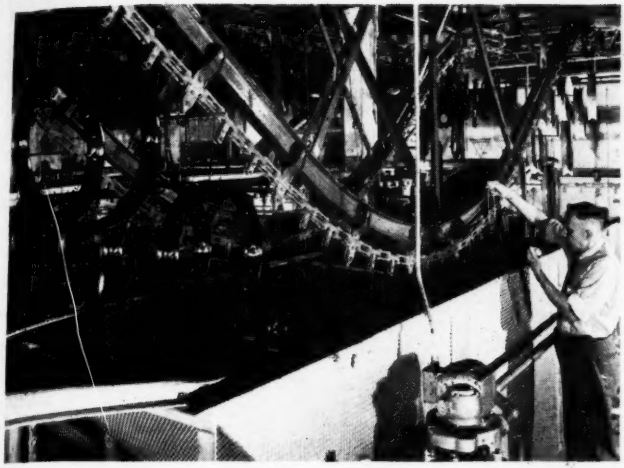
New Conveyorized System Facilitates Preparation of Parts for Enameling

A five-stage conveyorized Bonderizing system for chemically converting metal surfaces to thin layers of myriad microscopic phosphate crystals which serve as rust inhibitors and "anchors" for enamel has been installed in the enameling department of the Harley-Davidson Motor Co., Milwaukee, Wis. Parts such as rims, chain guards, forks and many miscellaneous items are first conveyed into a spray cleaning compartment where oil, grease, and other foreign matter are removed. A hot water rinse, one minute of phosphatizing, cold water rinse, and final chromate-acid rinse complete the five-stage chemical process.

Observation of parts emerging from the 325-deg. F. drying oven reveals a complete change in physical appearance; that is, the surface of each part is finely etched. It is this coating of non-conductor phosphate crystals that serves as both an enamel "anchorer" and rust inhibitor.

Corrosion, for example, resulting from a nick in the finish does not

Metallurgist Robert Hoffman, Harley-Davidson Motor Company, tests strength of phosphate coating solution. Rims at right emerge from conveyorized five-stage Bonderizer after being cleaned, hot water rinsed, phosphate coated, cold water rinsed, and finally chromic-acid treated.

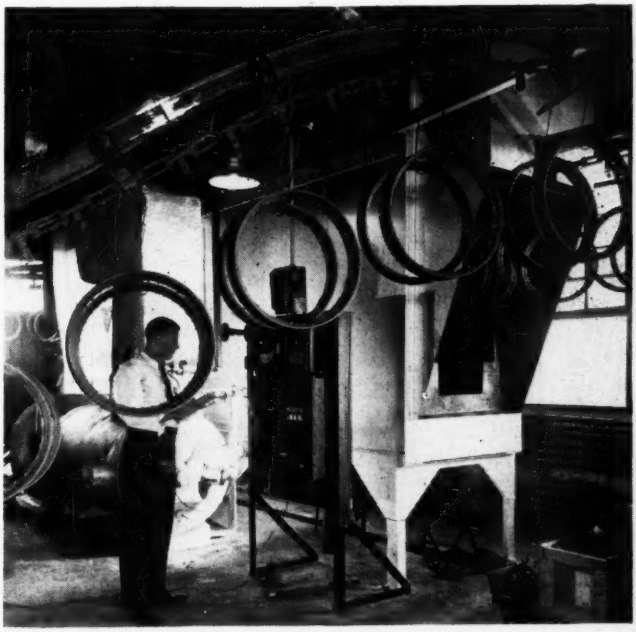


Louis Dame, enameling department foreman, Harley-Davidson Motor Company, determines viscosity of prime coat enamel in tank capable of holding 1,100 gallons. From this tank, the 960-foot long conveyor chain, moving at a rate of 4 feet per minute, transports the enamel-dipped parts to the prime coat bake oven on the roof.

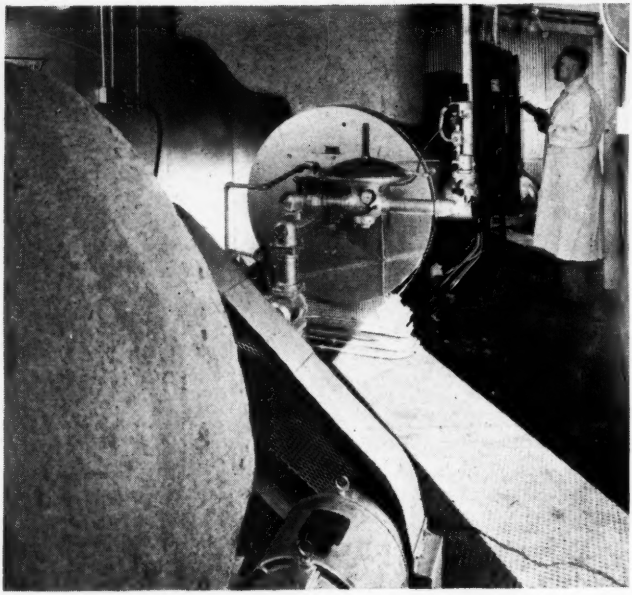
●

creep to spread its discoloring action to the surrounding area. Corrosion is localized to the area scratched, the pernicious effects of oxidation being unable to affect the non-conductor "skin" of phosphate crystals. New equipment has also been installed for the two enamel dips and the subsequent baking operations. Modern electrical controls are provided for closely regulating temperatures.

The complete conveyor system travels at the rate of 4 feet per minute, with a period of four hours required for work to make a complete trip on the 960-foot long chain. Since such parts as fenders, oil tanks, and tool-



Framed by phosphate coated motorcycle rims, Victor N. Ludwigson, assistant foreman, enameling department, Harley-Davidson Motor Company, records temperature of oven used to dry parts conveyed from Bonderizing system. Rims, now finely etched by phosphating, are ready for the prime coat dip.



Gas-fired electrically-controlled furnaces on roof of Harley-Davidson motorcycle manufacturing plant. Worker at the right is shown recording temperature of furnace generating 400-deg. F. heat for prime coat bake oven behind panel at left. Similar unit in foreground supplies 325-deg. F. heat for finish bake oven.

boxes are spray enameled, they are removed after phosphate coating to another conveyor and passed through a spray booth for application of a prime coat, and finally baked again.

Marchant Calculating Machine Features Enameled Aluminum Covers

THE Model ACT-10M calculating machine now being produced by the Marchant Calculating Machine Co., Oakland 8, Calif., features aluminum covers which are finished in a light satin green enamel developed by the company in cooperation with W. P. Fuller & Co., San Francisco, Calif. As the first step in the preparation for enameling, the aluminum parts are thoroughly degreased and the surface prepared for maximum paint adhesion by immersing the parts in a hot solution (210 deg. F.) of an alkaline cleaner for two or three minutes, rinsing in hot clear water, and then placing in an etching solution composed largely of phosphoric acid. The solution reacts with the aluminum, thereby producing a film of aluminum phosphate and also lightly etching the surface. The parts are again rinsed in hot clear water and thoroughly dried and then loaded on trays for spraying.

A coat of Fuller primer is first applied to the pretreated aluminum parts, after which the parts are placed in an electrically heated oven to bake for one hour at a temperature of 300 deg. F. The primer contains silicon which has an affinity for aluminum and promotes good adhesion. At the same time, the primer is very flexible and, therefore, reduces the possibility of paint cracking to a minimum.

After baking, the parts are cooled and then sprayed with a coat of Fuller-Marchant light satin green enamel and baked again for one hour at 300 deg. F. They are then cooled and sent to the sanding room for removing imperfections which are not discern-

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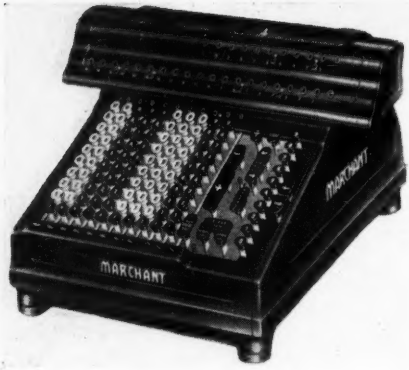


To provide the lowest possible index of reflectivity along with high quality appearance and maximum durability, this Marchant Model ACT-10M calculating machine is finished in a special light satin green enamel.

able until the first coat of enamel has been applied. Following sanding, the parts are cleaned with tack cloths and returned to the sprayroom for a final coat of green enamel, after which they are again baked at a temperature of 300 deg. F. for one hour.

Automatic Finishing System Increases Refrigerator Production

As a result of the installation of an automatic finishing system, the Crosley Corporation's refrigerator plant at Richmond, Ind., is now processing 1,100 refrigerators in an eight-hour day with less labor than previous equipment required for 800 boxes. Built and installed by the Despatch Oven Company, Minneapolis, Minn., the automatic system is designed to operate efficiently and economically in a limited floor space of 25 feet wide x 450 feet long, as shown in Fig. 1.

With floor space at a premium, Despatch engineers had to make use of all available space up to the 22-foot ceiling. Both dry-off and finish bake ovens are mounted overhead, thus permitting the use of floor space below for other purposes. The dry-off oven is installed directly over a six-stage Spra-Bonderite section. Floor space below the finish bake oven is utilized for conveyors, storage, and so on.

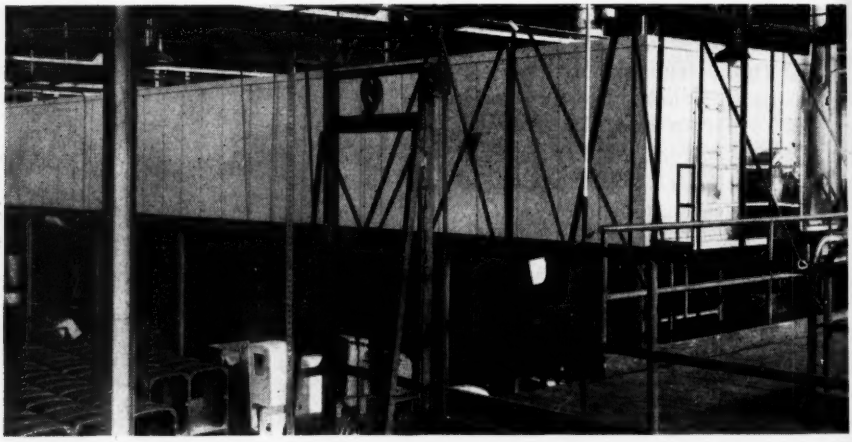
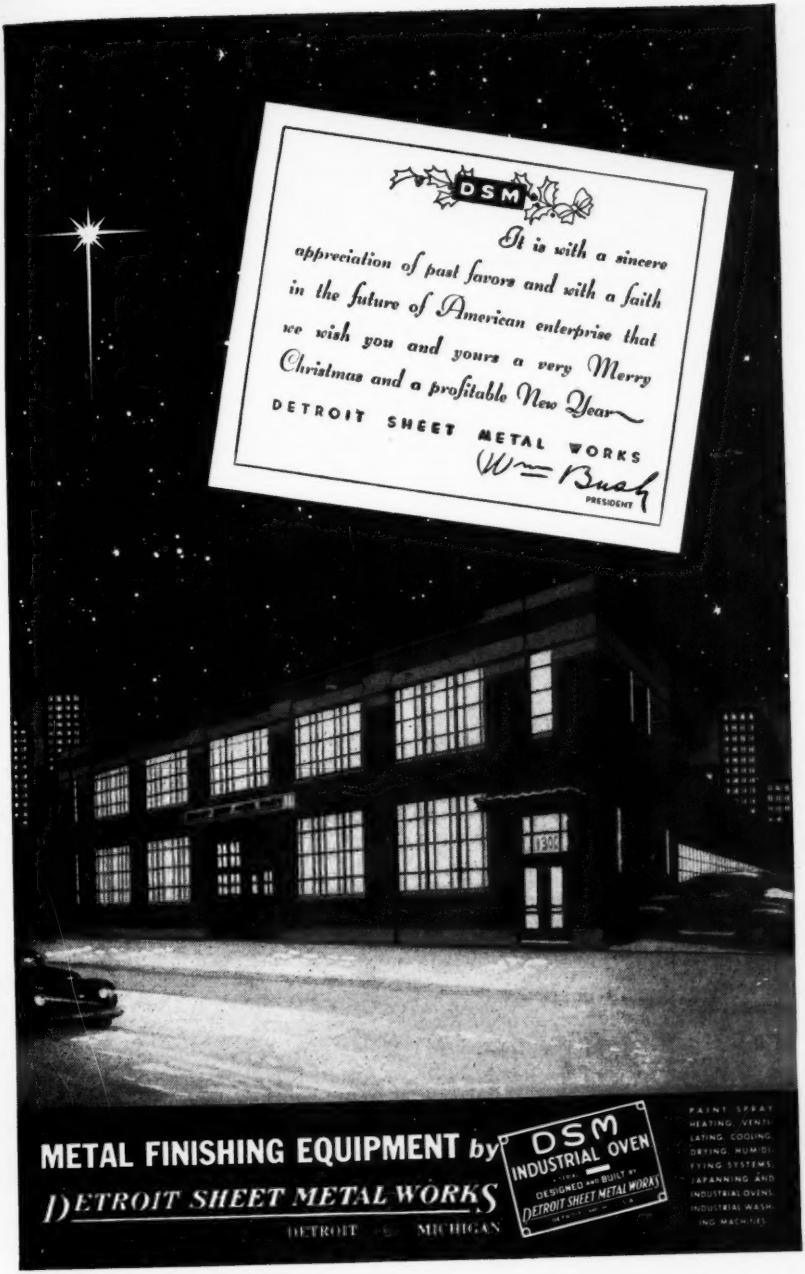


Fig. 1—This illustration provides a view of the automatic finishing system installed at Crosley Corporation's Richmond refrigerator plant.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Both ovens are of compact, multi-pass, horizontal design with direct gas-fired automatic forced convection heat. Temperatures are held uniform between 300 and 350 deg. F. Thorough drying of the work for 25 minutes following phosphate treatment eliminates the need for a blow-off operation. Traveling approximately 18 f.p.m., the variable speed monorail conveyor transports boxes and parts through the phosphating section and up into the dry-off oven and then down again to be transferred to the paint conveyor. The split conveyor system permits the paint and phosphating departments to work independently of each other, thereby reducing unproductive time to a minimum and eliminating complete shutdowns of the entire system.

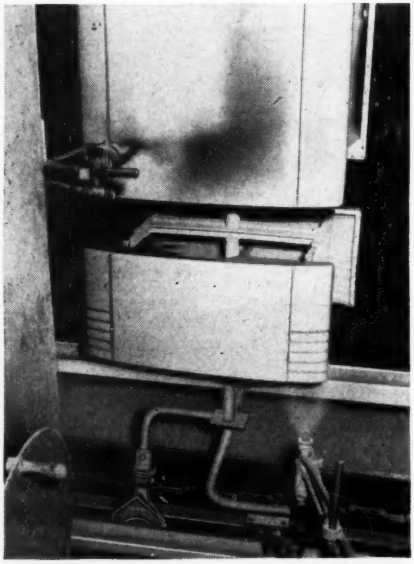


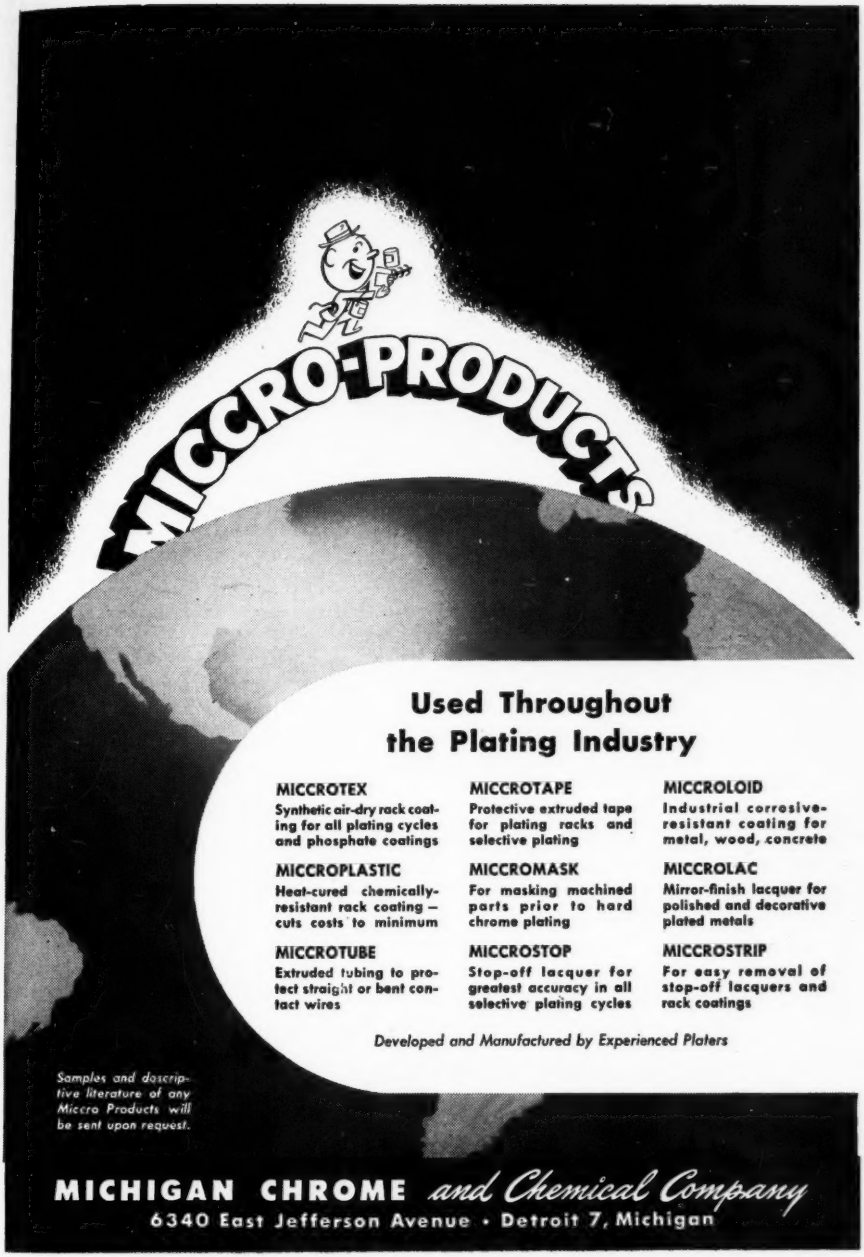
Fig. 2—In the automatic painting section, spray guns are mechanically synchronized with a special floor-type (pedestal) conveyor for painting both sides and top of each refrigerator box.

The automatic painting section for prime and finish coats consists of seven staggered spray booths installed in an enclosure 107 feet long. This sprayroom is supplied with heated and filtered make-up air. Glass windows permit observation of the painting process from the outside. In the enclosure, automatic spray guns are mechanically synchronized with a special floor-type (pedestal) conveyor and are set up to paint both sides and top of each box, as shown in Fig. 2. As the boxes and parts emerge from the sprayroom, one touch-up man puts the finishing touches on 137 refrigerators per hour.

From the touch-up station, the boxes and parts are conveyed up into the finish baking oven at a speed of approximately 12 f.p.m. by the variable speed paint conveyor. The parts are baked uniformly and thoroughly for 47 minutes as they make four horizontal passes through an oven 22 feet wide x 136 feet long x 11 feet 10 inches high. From the finish bake oven, the work descends to floor level again for inspection, unloading, and transfer to the assembly line.

Selenium Rectifiers. The Seletron Division of the Radio Receptor Co., Inc., 251 W. 19th St., New York 11, N. Y., announces an 8-page bulletin on the subject of selenium rectifiers for direct current requirements. Included are illustrations of rectifiers covering a range of voltages and currents, together with their electrical characteristics, dimensions, and weights. Copy free.

"Unichrome Dips for Zinc" is the title of a four-page bulletin published by United Chromium, Inc., 51 E. 42nd St., New York 17, N. Y. The bulletin provides details on Unichrome Clear Dip for producing a brilliant surface on ordinary zinc plate, as well as on Unichrome Black or Olive Drab Dip for protecting zinc and providing a decorative finish with one dipping. Copy free upon request.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NEWS of the Industry

Technical-Sales Conferences Held by Oakite

Members of the Central, Chicago, and Detroit divisions of Oakite Products, Inc., manufacturer of industrial cleaning and related materials, attended on September 8-10 at the Palmer House, Chicago, a technical-sales conference incorporating a series of lectures and round-table discussions on new materials and methods and their applications in industry. Highlighted on the conference agenda were special reports delivered by the company's research chemists, service engineers, and technical specialists.

Members of the Midwest, Southwestern, and Southern divisions of Oakite attended on September 15-17 at the Coronado Hotel, St. Louis, a similar technical-sales conference to that held at the Palmer House. A third Oakite technical-sales conference was held at the Hotel Commodore, New York, on October 6-8 at which time many interesting reports on new materials and methods in the industrial cleaning and allied fields were contributed by Oakite research chemists, service engineers, and technical specialists. The fourth and final of these regional conferences convened November 17-18 at the St. Francis Hotel, San Francisco, where members of the North and South Pacific Coast divisions participated.

Clawson Named P.E.I. President

C. D. Clawson, president of the Ferro Enamel Corporation, was named president of the Porcelain Enamel Institute at the 16th annual meeting held recently at the Hotel Cleveland, Cleveland, Ohio. He replaces Richard H. Turk, vice president of the Pemco Corporation.

Before joining Ferro Enamel in 1930, Mr. Clawson was associated with A-B Stoves, Inc., Republic Metalware, and the Chicago Vitreous Enamel Product Company.

Members of the Central, Chicago, and Detroit divisions of Oakite Products, Inc. who attended a technical-sales conference recently held at the Palmer House, Chicago

BUT . . .

His plodding—time-consuming—methods would be as hopelessly outdated as old fashioned ways of cleaning metals.

CHEMICALS ACP PROCESSES

RUST PROOFING AND PAINT BONDING

Granodine *
Duridine *
Alodine *
Lithoform *
Thermoil-Granodine *

RUST REMOVING AND PREVENTING

Deoxidine *
Peroline *

PICKLING ACID INHIBITORS

Rodine * ®

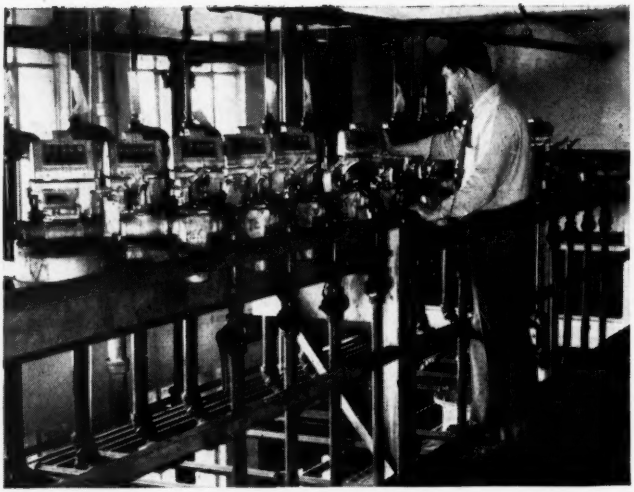
*Duridine**

used in power spray washers of mild steel, provides modern metal cleaning and phosphate-coating that is rapid—effective—economical. It removes oil, grease and other foreign surface matter—phosphatizes—changes the surface to a non-conductive phosphate film of uniform crystalline consistency. "DURIDINE" establishes a lasting adhesive bond for paint finishes. In addition, this bond prevents rust encroachment when painted surfaces are accidentally scratched or dented.

For proper cleaning and effective phosphatizing of metal surfaces—specify "DURIDINE".

*® for Metal Cleaning and Coating Chemicals

AMERICAN CHEMICAL PAINT CO.
AMBLER ACP PENNA.

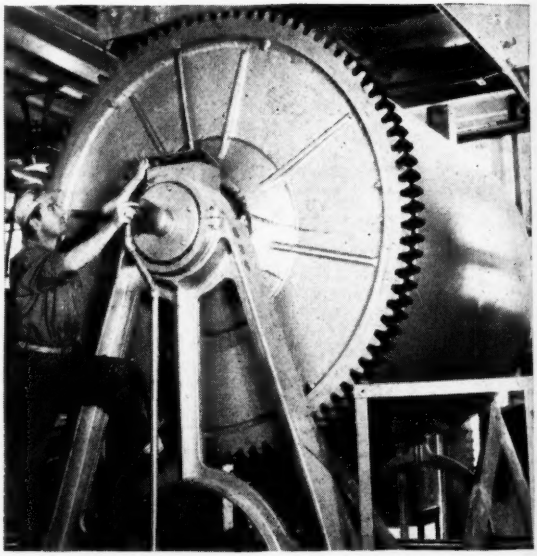


A Zapon pump technician meters solvents into a batch tank. Each of the meters shown controls a separate solvent. When all solvents selected have been automatically measured into the batch tank, they are then released by valve control to various mixing and pebble mill grinding equipment.

Modernization Plan Completed by Zapon

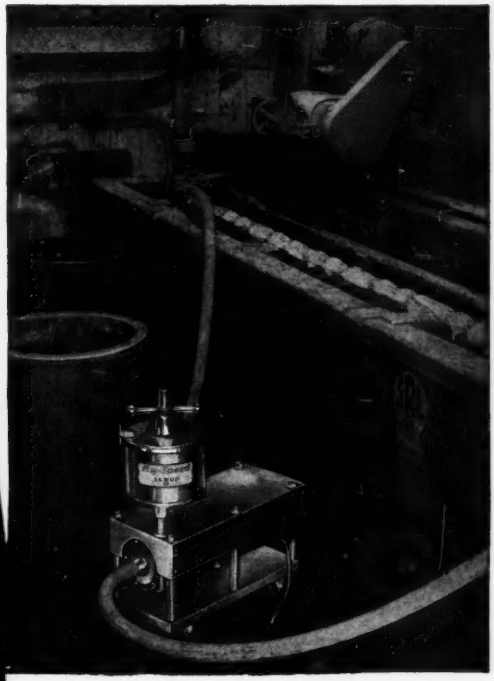
To meet postwar demands for the greater production of industrial finishes, the Zapon Division of Atlas Powder Company, with plants at North Chicago, Ill., and Stamford, Conn., has completed a vast modernization plan, according to E.H. Bucy, general manager of the division. New equipment has been added, rebuilding has been done, and key floor plans have been rearranged so that all tend toward greater productivity with heightened laboratory control. Concrete mezzanines were added so that solvents and resins could be piped directly from storage tanks to production areas by gravity flow.

Additional modern and up-to-the-minute facilities for pigment grinding were also installed, so that now each plant is equipped with late model number 3 roller-mills, steel-ball mills, and newest type Berylite mill. These physical factors, coupled with a newly augmented and streamlined "planning department," are said to assure the customer fine workmanship through high quality equipment and excellent supervision.



A Berylite ball mill receives a thorough checking over before resuming operations. This mill, one of the latest Zapon acquisitions for supplying better service, has an unusually short dispersing time, thus providing a high capacity for producing quality enamels.

The FILTER that Plating Shop Men Are Buying... ...ON ITS REPUTATION



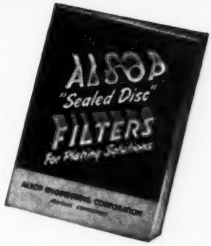
Outstanding for protection against pitting, spotting, poor adhesion, formation of nodules, etc., which mean rejects and reworking, *"Sealed-Disc"* Filters have won high reputation in plating rooms large and small all over the world.

You too, can take advantage of the savings in time and labor by using an Alsop *"Sealed-Disc"* Filter in your plant.

"Sealed-Disc" Filters remove all traces of dirt, dust, oil, sludge and all other impurities from plating solutions. They are light, compact, portable and easy to move from one tank to another for instant use.

Our new catalog gives you all the facts.

The Alsop Engineering Corporation, 212 Keen Street, Milldale, Connecticut.



Send For this New Catalog

Write for your copy of P-347 which tells exactly, how, why and where *"Sealed-Disc"* Filters can help you get finer finished plated work from your plating solutions.

ALSOP ENGINEERING CORPORATION

Filters, Filter Discs, Pumps, Tanks, Mixers, Agitators

Becomes Supervisor of Pennsalt's Special Products Research

William M. Lee has joined the research and development department of the Pennsylvania Salt Manufacturing Company as supervisor of the Special Products Division. After graduating from the University of Pennsylvania in 1927, Mr. Lee joined the Sharples Chemical Company and, four years later, became chief chemist with the Thomas M. Royal Papers Company in Philadelphia. Following this he was appointed research director of the Arabol Manufacturing Company of New York where he specialized in industrial adhesives.

William M. Lee

In 1942, the War Department invited Mr. Lee to become chief of the Chemicals and Plastics Section of the Office of the Quartermaster General. In this position, he planned, coordinated, and expedited research and development work on insecticides, germicides, rodenticides, special fuels, detergents, paints and other protective coatings, mildewproofing agents and water repellents for garments, molded plastics, optical films, coated fabrics, and high tensile strength laminates.

Newark Branch to Serve as A.E.S. 1948 Convention Host

The Newark Branch of the American Electroplaters' Society will be host to the 35th Annual A.E.S. Convention which is scheduled to be held on June 28, 29, 30 and July 1, 1948 in Atlantic City, New Jersey. The various committees are now functioning, and plans for a very successful industrial exhibit, as well as platers' exhibit, are progressing.

The Newark Branch has selected the Ambassador Hotel as convention headquarters. The Atlantic City Auditorium in which the industrial exhibit will be held is one of the largest and finest convention halls in America. Atlantic City is readily accessible by train, bus, or plane from every part of the nation.

Dr. Thomas P. May Joins International Nickel

Dr. Thomas P. May has joined the Corrosion Engineering Section of the Development and Research Division of The International Nickel Co., Inc., New York, according to an announcement made by T. H. Wickenden, manager of the division. Since 1940 Dr. May was with the Chemistry Division of the U. S. Naval Research Laboratory, Washington, D. C., where he served as head of the Corrosion Section. He received a bachelor of chemical engineeering degree from the Catholic University, Washington, D. C., in 1932, an M.S. degree in chemistry in 1935, and a Ph.D. degree in 1940.

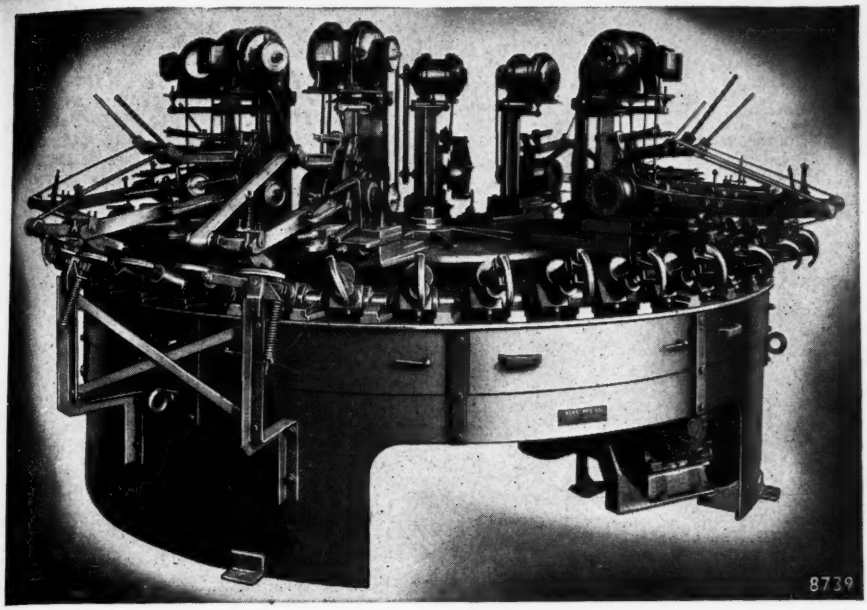
Dr. May is a member of the American Chemical Society, The Electrochemical Society, and the National Association of Corrosion Engineers. He is the author of several technical papers.

Appointed Manager of Industrial Sales

The Anderson Oil Company, Portland, Conn., manufacturer of "RustAvoid" preservatives and Lusol cutting fluid, announces that Clyde A. Sluhan, for several years its Connecticut salesman, has been appointed manager of industrial sales. In this capacity he will direct sales in the company's new expansion program.

Clyde A. Sluhan

Mr. Sluhan graduated from Ohio Wesleyan University in 1933 where he majored in chemistry. During the following three years he was a chemist and plant manager at the Atlanta, Georgia plant of Stodghill and Company, manufacturer of textile chemicals. From 1936 to 1942 he was associated with the American Cyanamid and Chemical Corporation where he performed laboratory work and was in charge of technical service in connection with wetting agents. Mr. Sluhan is a member of the American Society for Metals and the American Society of Chemists.



ACME

BELT HEAD POLISHING MACHINES

The ACME 10 ft. continuous rotary illustrated has eight adjustable belt heads for polishing flash on die cast handles at over 1100 per hr. It is but one of many ACME arrangements using belt polishing heads.

ACME Automatic Polishing Machines equipped with belt polishing heads are well suited to handle many production finishing jobs. They have been in successful use for many years. A wide range of cost cutting applications are made possible by varied arrangements of tables, camming fixtures, spindles, speed controls and other ACME engineered features.

ACME semi-automatic, straight line and small rotary polishing and buffing machines, together with the belt head type illustrated, meet virtually all production finishing requirements.

Consult A C M E on your production polishing and buffing equipment.

SPECIAL MACHINERY AUTOMATIC BUFFING MACHINES

ACME *Manufacturing Co.*

1645 HUWARD ST. DETROIT 16, MICH.

Builders OF AUTOMATIC POLISHING AND BUFFING MACHINES FOR OVER 35 YEARS

Paint Firm Observes Centennial

To commemorate its 100th anniversary, Thompson & Co., Oakmont, Pa., has issued a brochure picturing its history, production facilities, and products. The organization, specialists in product finishes and protective coatings, had its beginning back in 1847 with the construction in Pittsburgh of the first linseed oil mill west of the Allegheny Mountains. Later, as the region became more industrialized and towns and cities sprang up, it became apparent to the Thompson family that a market for paint was readily at hand. Therefore, in 1890 Edward Thompson, son of the founder, John Thompson, started a small paint factory near the site of the linseed oil mill. As the business prospered, it was moved to larger quarters and incorporated in 1905 into Thompson & Company.

(Left) J. V. Thompson (Right) E. K. Thompson

In 1926, due to the continued growth of the company, a new plant was purchased at Oakmont, Pennsylvania, approximately 12 miles from Pittsburgh. The purchase included approximately six acres of land to allow for future expansion. The laboratory, housed in a historic mansion overlooking the Allegheny River, has been remodeled and equipped with modern facilities for testing and developing paints, varnishes, lacquers, and synthetic coatings.

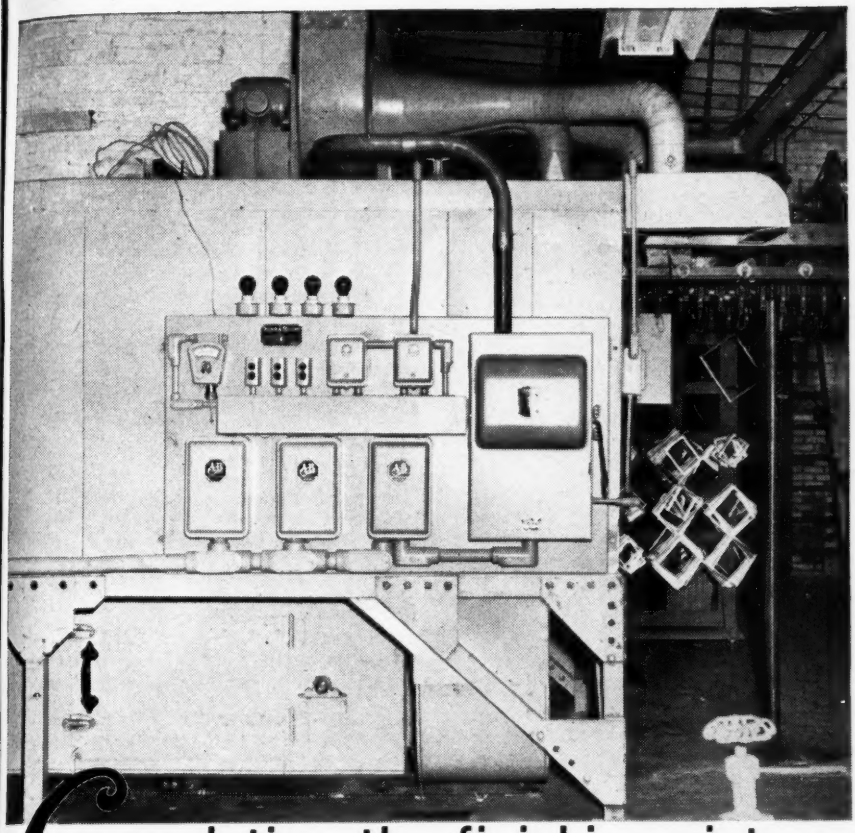
John Vincent Thompson, the present head of the company, was graduated from Cornell University in 1915 with a degree in chemical engineering and spent two years in research at Mellon Institute for Industrial Research on a paint fellowship. After service in World War I, he joined the company as production manager and treasurer. In 1924 he was elected vice president and general manager and, in 1936, upon the retirement of his father, he became president.

In addition to Mr. Thompson, the present officers of the company include D. D. Munroe, vice president and sales manager; E. K. Thompson, secretary and advertising manager; John E. Pyron, treasurer and purchasing agent; Adam W. Tritsch, assistant treasurer; and Gertrude H. Overholt, assistant secretary.

Establishes Three West Coast Offices

To better serve the West Coast, Gordon J. Berry, vice president of The Electric Products Co., 1725 Clarkstone Rd., Cleveland 12, Ohio, announces the establishment of district offices at Portland, San Francisco, and Los Angeles. In charge of the Portland office, which is located at 342 Sherlock Building, is William J. Cottrell, a graduate electrical engineer who has had extensive experience in the electric field. He was first employed by the General Electric Company in its transformer test and design departments. Later, he acted as electrical engineer for a mining company in Colorado, and following that served as sales manager for the Power Specialty Division of the Johns-Manville Company.

(Left to Right) William J. Cottrell, Donald T. Elliott and H. D. Easterbrook



Completing the finishing picture

. . . WITH A KIRK AND BLUM INDUSTRIAL OVEN!

• This Kirk & Blum conveyor-type oven is installed at S. E. Overton Co., South Haven, Michigan to dry picture frames. Increased production . . . improved finishes . . . savings in floor space, fuel and labor . . . all these are demanded by modern finishing operations. That "cover-all" requirement is the reason so many plants are installing KIRK & BLUM Industrial Ovens for drying and baking processes.

Accurate engineering data, pertaining to every type of oven equipment, has been acquired by KIRK & BLUM through 40 years of experience. Descriptive Bulletin 0, "Industrial Ovens," illustrates and describes many KIRK & BLUM installations, large and small. Write for your copy today. The Kirk & Blum Mfg. Company, 2816 Spring Grove Ave., Cincinnati 25, Ohio.

KIRK AND BLUM

INDUSTRIAL OVENS

The San Francisco representative is Donald T. Elliott, with offices located at 921 Howard Street. Mr. Elliott holds a B.S. degree in electrical engineering from the University of California and is a member of Tau Beta Pi fraternity. June of 1946 marked the termination of his tour of active duty with the U. S. Naval Reserve.

In Los Angeles, the office of The Electric Products Company is located at 1262 South Boyle Avenue and is under the direction of H. D. Easterbrook. With a 1910 B.S. degree in electrical engineering from the University of Illinois, Mr. Easterbrook joined the Westinghouse Electric Corporation and remained with that company until 1940 when he became a manufacturer's agent after 30 years of selling in the Los Angeles district. Mr. Easterbrook belongs to the Electric Club of Los Angeles, the Electrical Maintenance Engineers Association, and the Materials Handling Association of Southern California.

Culp Named Pacific Coast Industrial Sales Manager

The appointment of W. Ray Culp as manager of industrial sales, Pacific Coast, for the paint division of Pittsburgh Plate Glass Company has been announced by Herschel E. Post, general sales manager of industrial finishes for the company. Mr. Culp succeeds R. Stanton Richter who will serve the West Coast area as a sales representative specializing in automobile production finishes.

W. Ray Culp

Associated with Pittsburgh Plate Glass Company's paint division since 1935, Mr. Culp has served in the company branches at Fresno, Sacramento, and Oakland. He was appointed industrial sales representative in May 1942, which position he held until his recent promotion. As manager of industrial sales, his headquarters will be at 7412 Maie Avenue, Los Angeles, California.

Mr. Richter has been associated with Pittsburgh Plate for 27 years and served at Denver, New York, and San Francisco prior to appointment as manager of industrial sales, Pacific Coast, during 1940.

Parker Rust Proof Promotes Rankin

The Parker Rust Proof Co., Detroit, Mich., announces the promotion of J. F. Rankin to the position of comptroller, which was recently held by H. J. Strasler, who died on October 3.

Mr. Rankin has been assistant comptroller for the past five years and prior to that was assistant manager of the Federal tax department of the Union Guardian Trust Company.

J. F. Rankin

Advance Paint to Expand

A million dollar expansion program designed to increase present production capacity six times has been announced by the Advance Paint Company, Indianapolis, manufacturer of industrial finishes. Early in 1948, the company will move all of its manufacturing facilities to newly acquired and constructed property in Indianapolis and will dispose of its present plant.

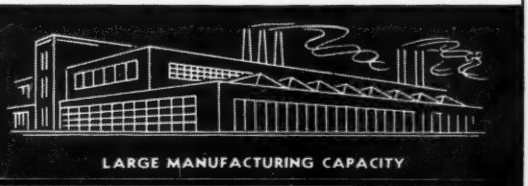
The new factory layout will be centered around a large four-story and basement building which the company has purchased. This building alone has 120,000 square feet of manufacturing floor space and will enable the company to utilize gravity processes throughout the manufacture of its products. Four other buildings are being constructed at the new factory site. A two-story and basement building will house offices and a cafeteria on the first floor and complete laboratory facilities on the second floor.

A new varnish and synthetic resin plant will provide an additional 10,000 feet of floor space. Also under construction are a tank storage plant with a capacity of 400,000 gallons of raw material, and a special building for the storage of nitrocellulose.

4 EXTRA VALUES BEHIND AHCO PRODUCTS

ANODES
BUFFING COMPOSITIONS
METAL CLEANERS

1. 96 years of experience and research is represented in the manufacture of these quality products. Production facilities occupy several thousand square feet in modern buildings.



LARGE MANUFACTURING CAPACITY

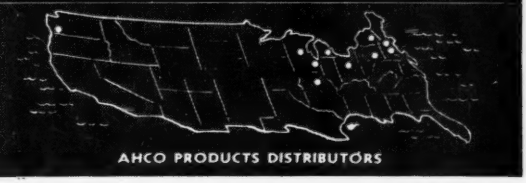
2. The large storage facilities, the economical means of purchasing and handling carload quantities keep prices at lowest levels. All plating and finishing supplies available from one source.

LARGE STORAGE FACILITIES

3. We maintain a well equipped chemical laboratory manned by competent chemists. The services of this laboratory are available for analytical and consulting work on specialized problems.

MODERN CHEMICAL LABORATORIES

4. Distributors for AHCO products are located in principal cities throughout the United States to facilitate nation-wide distribution. Shipments are made 24 hours after order is received.



AHCO PRODUCTS DISTRIBUTORS

APOTHECARIES HALL CO.

BOX A

WATERBURY 88 CONN.

Gallaher Awarded Gold Medal

Edward B. Gallaher, president of The Clover Manufacturing Co., Norwalk, Conn., recently received the Crowell Gold Medal from the Army Ordnance Association for distinguished ordnance service. The award took place at the 20th Annual Dinner Meeting of the association held recently in the Grand Ballroom of the Waldorf Astoria Hotel in New York City.

Edward B. Gallaher

Mr. Gallaher is widely known as one of the country's foremost authorities on coated abrasives and lapping compounds.

Named General Sales Manager

According to an announcement made by Max C. Jones, company president, C. H. Wills has been named general sales manager of the Michigan Abrasive Co., Detroit, Mich. Mr. Wills will have complete responsibility for the world-wide sales of Michigan Abrasive materials, which include sheets, rolls, discs and belts of all types and sizes.

C. H. Wills

A veteran in the mill supply field, Mr. Wills joins Michigan Abrasive after 10 years as Detroit-Toledo representative for another abrasive company.

Kelite Occupies New Plant

According to an announcement made by Kelite Products, Inc., manufacturer of industrial chemicals, the job of moving all Kelite manufacturing operations to the company's new Los Angeles plant has been completed. The new plant is situated on seven acres of land within a few blocks of the Los Angeles City Hall. It is on the main line of the Union Pacific Railroad, and each unit of the plant has its own railroad siding and truck loading dock.

The main building for the manufacture of industrial chemicals covers 65,000 sq. feet and is said to include every modern facility for the processing and manufacture of industrial cleaning materials.

Ferro Opens Chicago Office

The Ferro Enamel Corp., Cleveland, Ohio, announces the opening of a new office at 336-38 North Central Avenue, Chicago, Illinois. G. W. Hofstetter, Ferro's Midwest sales and service manager, will make his headquarters at the new office, which will serve customers in the porcelain enamel, pottery, synthetic finishing, and allied fields. Finishes, equipment, and special services will be offered for the entire Chicago territory.

G. W. Hofstetter

Opening of the Chicago office is part of Ferro's postwar expansion program which now includes new branch offices in New York, Detroit, and St. Louis and new manufacturing plants in Nashville and San Francisco.

Gwyer Joins H-VW-M

The Hanson-Van Winkle-Munning Co., Matawan, N. J., announces the appointment of Eugene G. Gwyer to its staff of engineering. Mr. Gwyer was a pilot in the Army Air Forces until his discharge on February 26, 1946. He was shot down during a bombing raid over Paris on April 4, 1943, and was interned in Germany for 25 months.

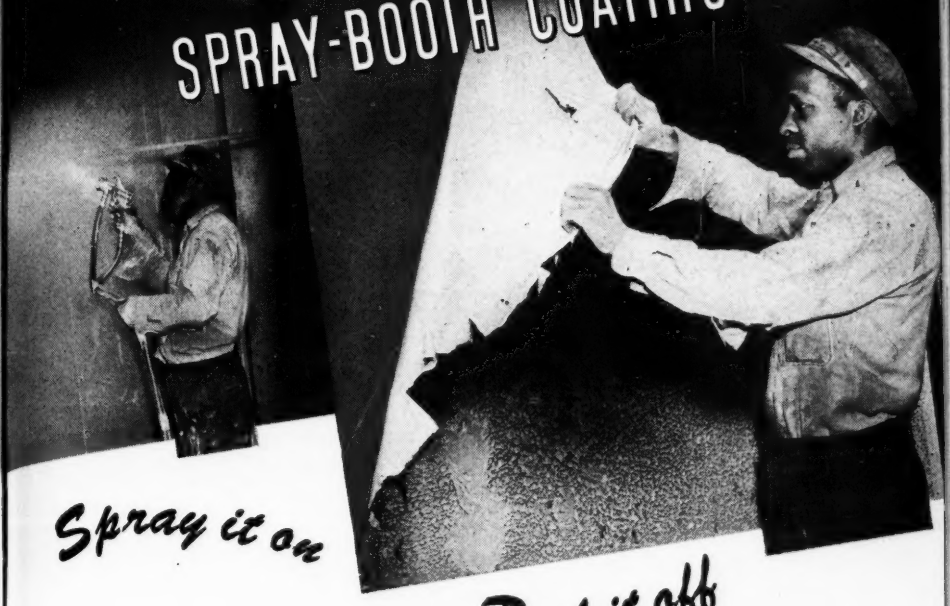
Mr. Gwyer will be located in Matawan, working in the engineering sales departments of H-VW-M.

FOR ASSURED SATISFACTION — GET ORIGINAL AND GENUINE

LIQUID ENVELOPE

PEELABLE PROTECTIVE PLASTIC FILM

SPRAY-BOOTH COATING



Spray it on

Peel it off

A CLEAN BOOTH IN MINUTES!

Product of America's longest and broadest experience in making *peelable* plastic films. Now used by hundreds of important plants. Quick-drying. Not a soap or emulsion. Does not rely on overspray to form a film. Peels easily no matter how heavy or light the overspray at any point in booth. White color improves booth illumination. Film non-combustible.

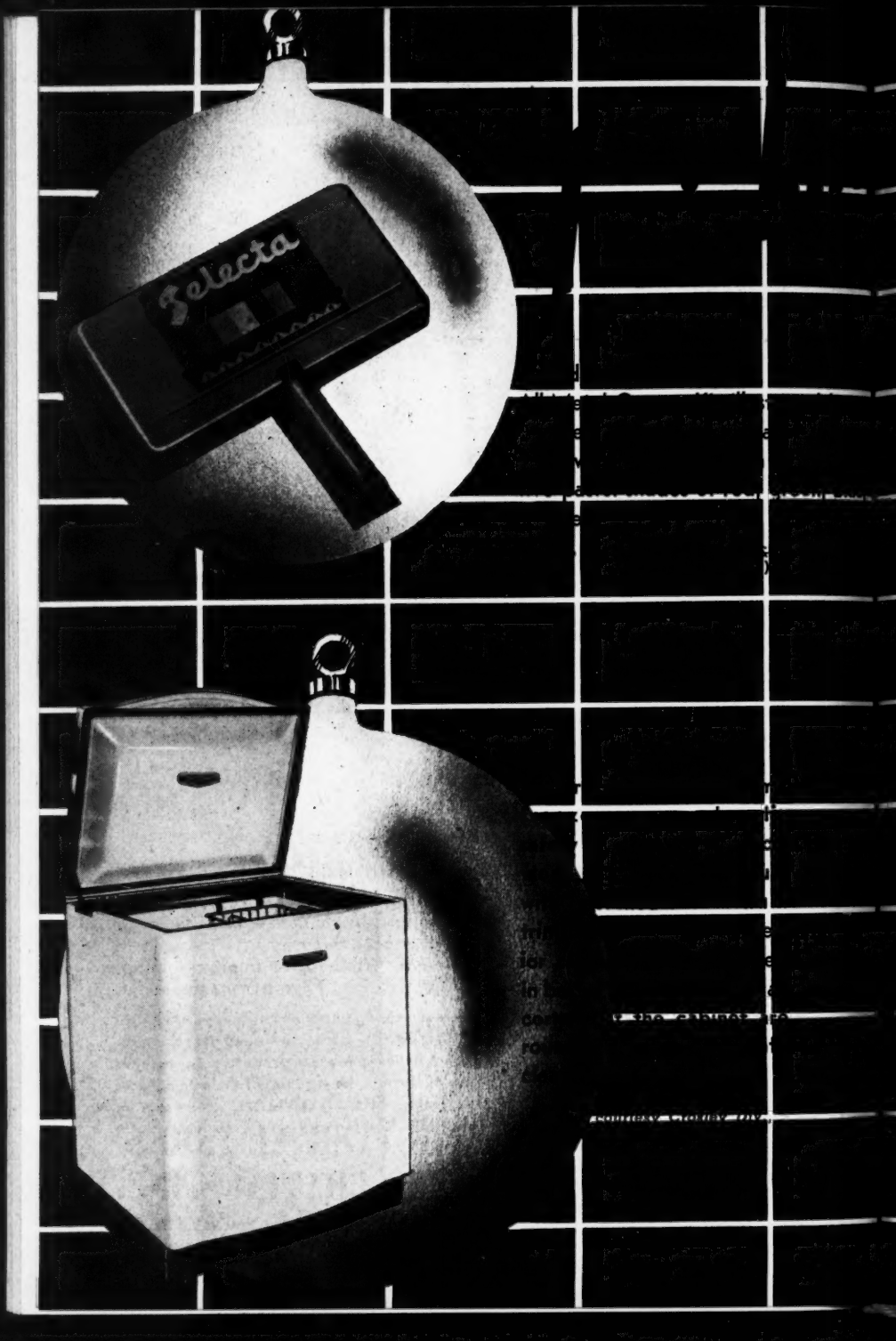
Many cheap imitations of genuine "LIQUID ENVELOPE" are being rushed onto the market by inexperienced producers. For assured satisfaction, be sure to get the original and genuine "LIQUID ENVELOPE" made only by

BETTER FINISHES AND COATINGS, INC.

272 Doremus Ave., Newark 5, N. J.
122 E. 7th St., Los Angeles 14, Cal.

TEST-SAMPLE OFFER

1 gallon can, shipped prepaid on a money-back guarantee $4.45, complete with instructions and attractive low prices on quantity re-orders.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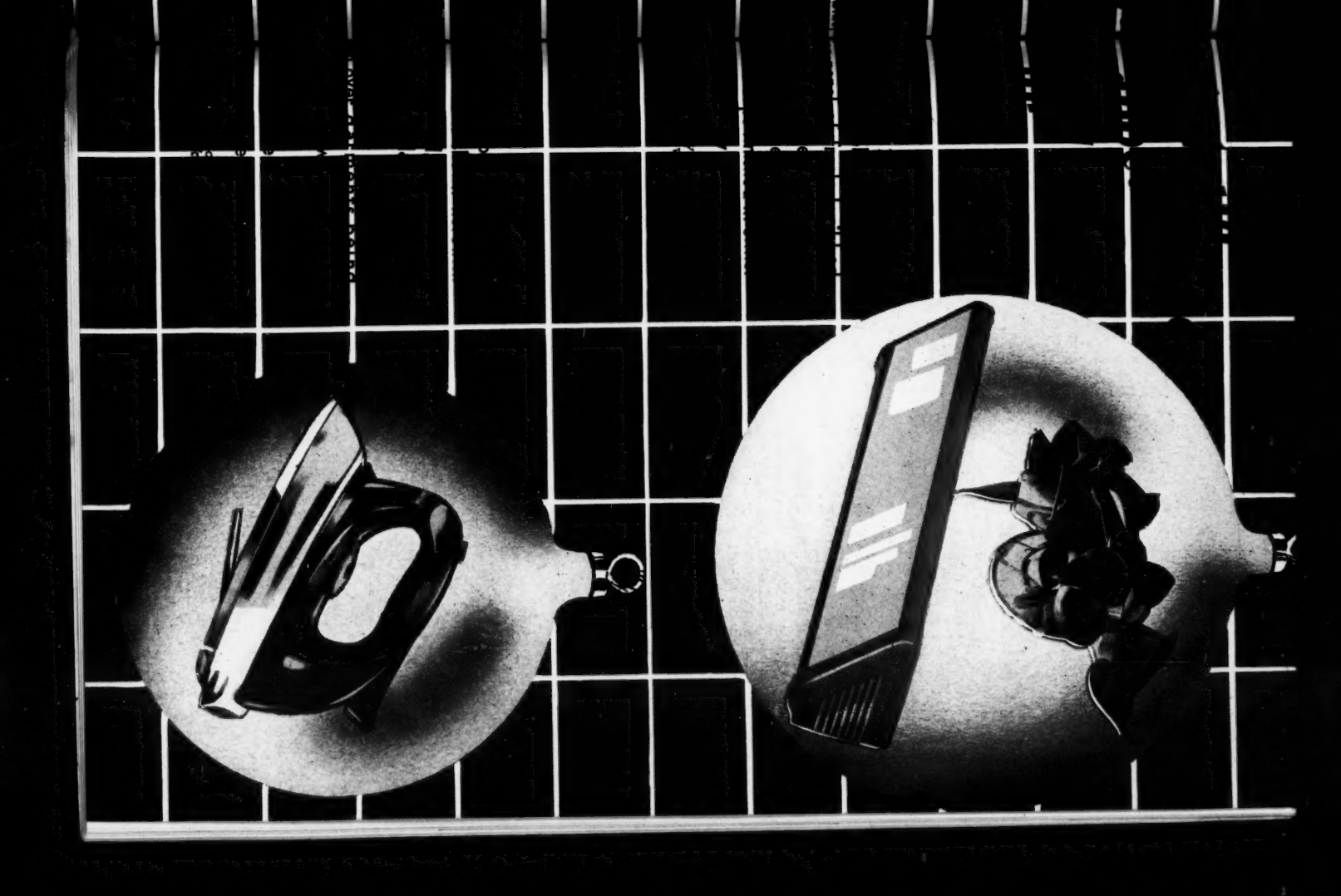


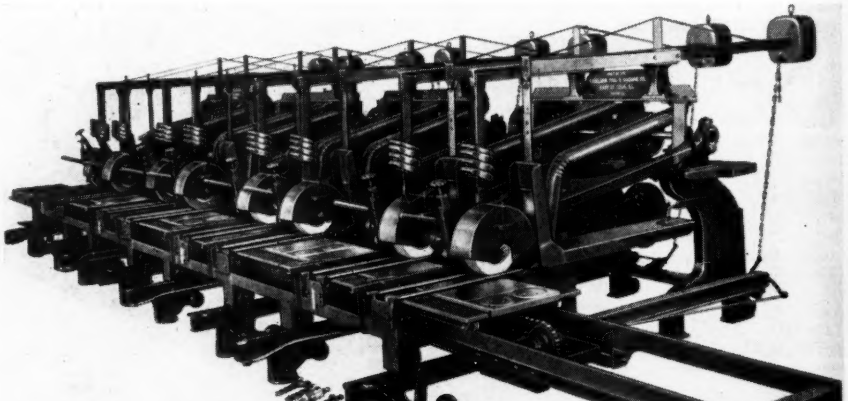
New Equipment and Materials

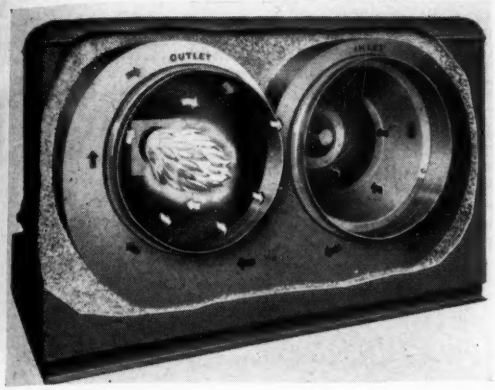
Excelsior No. 27FM Automatic High Speed Ball Bearing Multiple Spindle Grinder and Polisher

Identified as the No. 27FM, an automatic high speed ball bearing multiple spindle grinding and polishing machine for stove tops, as well as other flat or semi-flat surfaces, has been developed by the Excelsior Tool & Machine Co., 3100 Ridge Ave., East St. Louis, Ill. The machine is equipped with high speed grinding wheels which are said to provide for an unusually fast grinding action together with long life and are designed to generate minimum heat and dust, thus enabling a fine finish to be readily and economically obtained.

The Excelsior No. 27FM Multiple Spindle Grinding and Polishing Machine is supplied assembled in sections complete with ball bearings and totally-enclosed dustproof fan-cooled motors with magnetic switches and push-button controls. The machine is available in 4, 6, 8, and 10-wheel models. The 4-wheel model mea-

Excelsior No. 27FM Automatic High Speed Ball Bearing Multiple Spindle Grinder and Polisher





Scroll-Aire Oven Heater

sures 32 feet 10 inches long x 14 feet 8 inches wide x 6 feet 9 inches high and weighs 16,000 lb. The 6-wheel model measures 32 feet 10 inches long x 14 feet 8 inches wide x 6 feet 9 inches high and weighs 20,000 lb. The 8-wheel model measures 40 feet long x 14 feet 8 inches wide x 6 feet 9 inches high and weighs 26,000 lb. The 10-wheel model measures 47 feet 3 inches long x 14 feet 8 inches wide x 6 feet 9 inches high and weighs 33,000 pounds.

Scroll-Aire Oven Heater

An oven heater for paint drying ovens, core and mold ovens, moisture drying ovens, and industrial processing ovens, designated as the Scroll-Aire, is announced by the Newcomb-Detroit Co., 5741 Russell St., Detroit 11, Mich. The unit is a direct gas-fired heater which is designed to mix the products of combustion directly into the air stream. Both the main and pilot burners are of an approved enclosed pressure type using low pressure combustion air. According to the manufacturer, there is no open flame in the production department and positive control is provided.

Due to high combustion efficiency and the simplified heating principle, the Scroll-Aire Oven Heater is said to reduce fuel consumption to a minimum. To further increase efficiency, the entire fan and heater unit is enclosed in a steel case with tightly packed insulation throughout. The scroll type heater is a packaged heating system within itself and includes a gas manifold, combustion air manifold, temperature controls, and safety controls which may be installed at the factory, thus permitting a factory test of the unit prior to shipment. The heater is said to be particularly adaptable for "rejuvenating" old ovens with inadequate temperature ranges, insufficient capacity, or inadequate heat distribution systems.

The Scroll-Aire Oven Heater is available in four standard models having 5,000, 10,000, 15,000, and 20,000 c.f.m. air capacities. Each model is available in a wide choice of burner capacities from 250,000 to 4,000,000 B.T.U. Electric ignition, push-button starting and stopping, modulating temperature controls, and many other features are incorporated in the heater.

Magnus Aja-Dip Cleaning Machine

The Equipment Division, Dept. PF, Magnus Chemical Co., Inc., Garwood, N. J., has redesigned its Magnus Aja-Dip Machine. The outward appearance has been streamlined, with grouped control and instrument panel and attractive finish.

Magnus Aja-Dip Cleaning Machine

The drive mechanism is entirely located in the front of the machine for easier access and servicing.

All the well-known and patented mechanical features of the Magnus Aja-Dip Cleaning Machine have been retained. In use, positive, fast cleaning is said to be obtained by mechanically raising and lowering the platform containing the soiled parts up and down 60 times a minute through the cleaning solution with an 8-inch vertical stroke. This procedure imparts a strong "shearing" action to the cleaning solution which actually "cuts the dirt." The fast, vertical motion of the work in the cleaning solution forces the cleaning fluid through all intricacies and recessed portions of the work, bringing new active solution into contact with the dirt with every up and down stroke.

Cleaning with the Magnus Aja-Dip Machine is said to be effected automatically and thoroughly, the only manual labor required being for loading and unloading the work. The machine is available in 13 sizes and types from the Midget type handling a few pounds of work to the Jumbo type handling 2,200 lb. at a time. The machine may be used with either hot or cold cleaning solutions. If a hot solution is to be employed, it may be heated by steam, electricity, oil, gas, or kerosene, according to the user's desire.

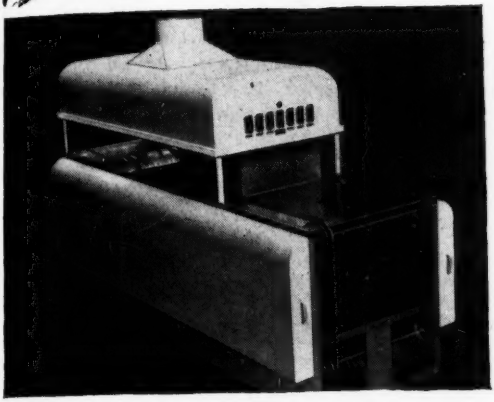
The Magnus Aja-Dip Cleaning Machine is recommended for use in automotive service shops for cleaning automotive parts and blocks; manufacturing plants for the production cleaning of metal parts and units; aviation and railroad repair shops; typewriter and business machine repair shops, and maintenance departments of industrial plants.

"Dura-Black" Finish

An efficient and economical black finish for copper, brass and copper alloys, to be known as "Dura-Black" is announced by the Heatbath Corp., Springfield, Mass. Rich deep black in appearance, the finish is obtained at low temperatures through chemical action brought about by the ability of metal surfaces to react favorably to the laboratory controlled Dura-Black formula.

According to the manufacturer, Dura-Black Finish has substantial durability and is an excellent base for paints and enamels. Its economy and ease of operation are said to make the finish ideal for mass production as well as for precision parts since there is no build-up. The

It's New!



GYRA-FLOW

CONTINUOUS FINISHING SYSTEM

- Sprays
- Dries
- Cleans
- Bakes
- Dips
- Rinses

In One Uninterrupted Cycle!

Not everyone agrees on the new hemline, but it IS agreed that the new GYRA-FLOW may solve your specific finishing problem.

GYRA-FLOW is custom-built to do a fast, tear-free finishing job on the product you manufacture. *Get the facts NOW!*

PHONE, WIRE or WRITE TODAY FOR COMPLETE DETAILS!

GEORGE KOCH SONS, Inc.

INDUSTRIAL EQUIPMENT

EVANSVILLE, INDIANA, U. S. A.

Sales offices in leading industrial centers:

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William Printz Co.
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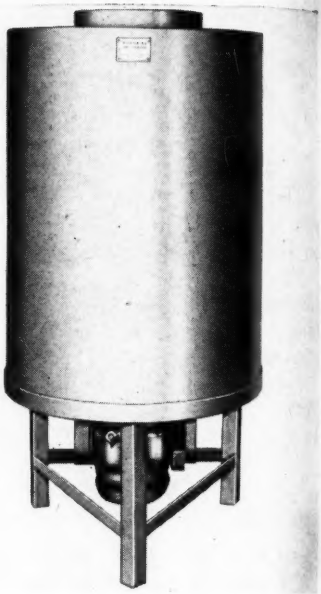
LOS ANGELES
Industrial Systems Co.
241 S. Central Ave.

finish can be readily applied to metal parts by immersing in a solution consisting of Dura-Black material and water. The Dura-Black material, it is claimed, does not deteriorate in storage, does not require an energizer, and does not throw off objectionable fumes. The only replacements necessary are those used to compensate for mechanical drag-out on the parts being treated and a small amount used chemically by the process.

Industrial Fume Separator

A fume separator which is said to clean contaminated air without the loss of room heat has been placed on the market by the Industrial Electroplating Co., Inc., 219 W. Vermont St., Indianapolis, Ind. The unit is designed to draw contaminated air off electroplating tanks, clean it by water absorption and centrifugal separation, and return pure air to the shop without wasting heat. According to the manufacturer, the unit utilizes a minimum of ductwork, thus making installation and maintenance simple and economical.



Industrial Fume Separator

The Industrial Fume Separator is recommended for the control of fumes from such solutions as anodizing, chromic acid, caustic soda, caustic oxidizing, sulphuric acid, and all cyanide solutions. It is also recommended for the control of fumes from ceramic paints and alkaline solutions. The unit is available in two models, one having a capacity of 1,500 c.f.m. and the other a capacity of 3,000 c.f.m. Each model is available with separating chambers of plain carbon steel or stainless steel.

Priming and Finishing Paints

The Cheesman-Elliot Co., Inc., 639 Kent Ave., Brooklyn, N. Y., is now marketing priming and finishing paints made with Resin "A" produced by the Standard Oil Company of New Jersey. According to the manufacturer, the paints embody the unusual qualities of this resin, which is a by-product of synthetic rubber research and possesses outstanding adhesion to galvanized iron and other difficult-to-coat surfaces, together with high alkali and acid resistance.

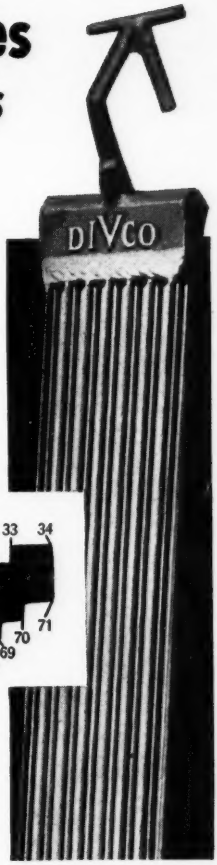
START RIGHT!
INSURE A PERFECT FINISH

DETROIT
Handy 'Tac' Rags
(Trade Mark Reg.)

Remove all Dust, Lint and Sand Particles from the Surface before Finishing.
Successfully used by leading Industrial Plants for over 11 years.
If your local Paint Dealer cannot supply you, write to Manufacturer.

Detro Sales Co.
414 NORTH SAN PEDRO ST.
LOS ANGELES 12, CALIFORNIA

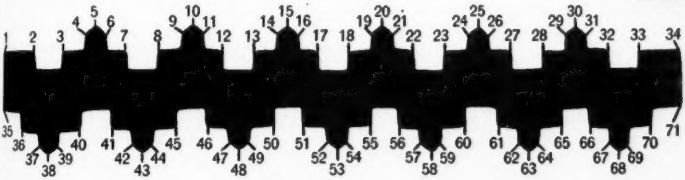
Divco 71-Point Lead Anodes
churn chrome plating solutions like a boat propeller—



The minute you see the 71 throwing edges at work you will know why Leading Platers are standardizing on Divco 71-Point Anodes.

Violent agitation of the solution demonstrates anode efficiency never before equaled — Shows the self scrubbing action that sweeps surfaces clean and eliminates stagnation.

No wonder disintegration is uniform and Divco 71-Point Anodes retain their great efficiency throughout an exceptionally long service life.



Count the 71 throwing edges

This cross section shows why the patented 71-point design gives throwing power found in no other anode. *Still greater efficiency and convenience is afforded by the first cast copper hooks ever used on lead anodes.*

RESULTS TALK — Try Divco 71-Point Anodes in your own chrome plating tanks and *see the difference!* Be ready to gain the great advantage of Divco 71-Point efficiency when you replace anodes. Order test anodes today or write for literature.

Avoid Substitutes!

Insist on Divco 71-Point Anodes from your Jobber or order direct. Look for "DIVCO" beneath the hook or count the 71 edges.

"A Good Name Carries Weight"

Division Lead Co.

830 W. Kinzie St. Chicago 22, Ill.

Other DIVCO PRODUCTS

LEAD

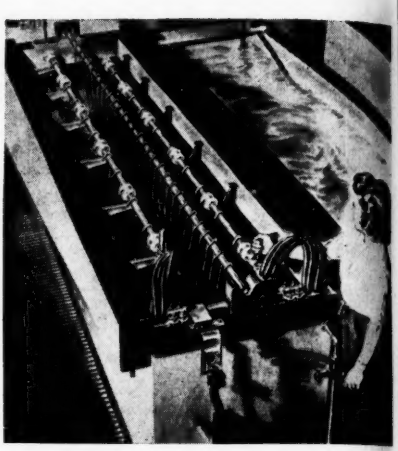
Antimonial — Chemical — Tellurium

in Pipe — Sheet — Foil or Fabricated for All Plating Shop Requirements

H-VW-M Adjustable Anode Rod

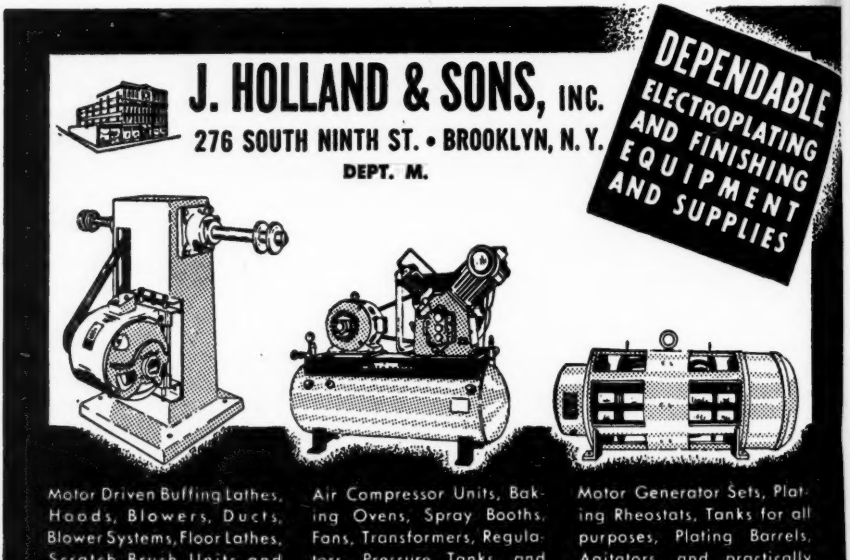
The Hanson-Van Winkle-Munning Co., Matawan, N. J., announces the development of an adjustable anode rod for use in alkaline solutions and also chrome baths which is said to permit the uniform plating of irregularly shaped parts in still plating tanks. The device consists of brackets welded or bolted to the tank wall to which steel plates or arms, insulated on either side with phenol fiber, are pivotally attached. At the outer ends of the arms are swivel fittings on which are mounted annular clamps containing insulators which surround and support the anode rod. These insulators, formed in two halves, can be easily installed and clamped in place around the rod, while the ball anode holders or straight elliptic anodes, as the case may be, are supported by the rod.

The rod is of sturdy, simple design, capable of supporting several hundred pounds of anode material which can be moved to any desired position with a minimum of effort. Electric current is supplied by means of a flexible cable attached to one end of the rod, while an insulated handle is provided at the other end to permit adjustment as required.



Still plating tank equipped with H-VW-M Adjustable Anode Rods

The rod is also said to provide decided advantages where a large variety of parts are processed which require varied anode-to-cathode distances. A uniform


J. HOLLAND & SONS, INC.
276 SOUTH NINTH ST. • BROOKLYN, N. Y.
DEPT. M.
DEPENDABLE ELECTROPLATING AND FINISHING EQUIPMENT AND SUPPLIES
Motor Driven Buffing Lathes, Hoods, Blowers, Ducts, Blower Systems, Floor Lathes, Scratch Brush Units and practically everything for the Buffing Department.
Air Compressor Units, Baking Ovens, Spray Booths, Fans, Transformers, Regulators, Pressure Tanks, and practically everything for the Spray Department.
Motor Generator Sets, Plating Rheostats, Tanks for all purposes, Plating Barrels, Agitators, and practically everything for the Plating Department.

RESEARCH-FITTED TO SUIT YOUR NEEDS EXACTLY

CARPET

FELT

MOHAIR

SUEDE

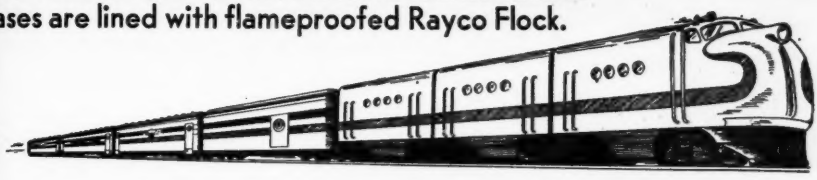
VELOUR

"SPANGLES"

Rayco Flock Synthetic Finishes

IN ANY COLOR—ON ANY MATERIAL

In the FREEDOM TRAIN the historical document cases are lined with flameproofed Rayco Flock.



Rayon Processing Co. of R. I., Inc.

PIONEER PRODUCERS OF SURFACE COATING FLOCKS

65 TREMONT STREET • CENTRAL FALLS, R. I.

POLLAK PAINT CO.
715 Main St.
Buffalo, N. Y.

LAMBERT-NEW ENGLAND CO.
79 Sudbury St.
Boston, Mass.

H. R. MEININGER CO.
409 16th St.
Denver, Colorado

J. GORDON SMITH CO.
3901 Main St.
Dallas, Texas

deposit can be obtained since the anodes may be quickly moved to the most advantageous position relative to the work being plated.

Kidde 40-Gallon Foam Fire Extinguishing Engine

A 40-gallon foam fire extinguishing engine with automatic mixing controls is announced by Walter Kidde & Co., Inc., Belleville, N. J. Discharging 450 gallons of fire-killing foam, the unit is said to smother both Class A fires (involving ordinary combustible materials) and Class B fires (flammable liquids). A unique metering control mixes solutions in measured quantities, thereby providing for maximum foam output of the engine.

Mounted on 50-inch wheels with 2½-inch steel tires, the extinguisher can be moved about rapidly and easily. The hose rack contains 50 feet of 1¼-inch coupled chemical hose with a shutoff discharge nozzle, thus providing the operator a wide radius of action. The indoor model occupies a floor space of 31 x 50 inches and is said to be especially suitable for refineries, mills, chemical plants, paint and machine shops, and factories. The outdoor type is identical to the inside model except for a wider gauge carriage.

Kiddle 40-Gallon Foam Fire Extinguishing Engine

The Kidde 40-Gallon Foam Fire Extinguishing Engine is neatly and conspicuously finished in Fire Department red enamel with black enamel trim and carries the approval of Underwriters' and Factory Mutual Laboratories.

Niederst Backstand Idler

An unusually rugged yet lightweight backstand idler which is designed to accommodate polishing belts from ½ to 6 inches wide is now being marketed by the Niederst Co., 3506 S. Michigan Ave., Chicago 15, Ill. Designed to permit the use of present polishing and buffing lathes for belt polishing, the unit includes a contact wheel and idler pulley over which the belt operates.

In addition to manufactured contact wheels, the Niederst Backstand Idler is designed to use buff contact wheels. Any width wheel desired may be obtained by placing as many sections of buffs as desired on the lathe spindle. The hardness or density is controlled by using stitched or loose buffs. Loose buff wheels may be

FOR WOOD AND METAL FINISHES
Use Bright, Rich
HARDCOTE
One Hour Dry
• One coat covers to give your products a beautiful, full gloss finish that can really take it. Hardcote resists acids, alkalis, and weather. Easy to apply by brush, spray or dipping. Tack dries in 15 minutes, dries hard in one hour. Write for color card and information. Made only by
McDOUGALL-BUTLER CO., Inc.
6 Evans Street
Buffalo, New York

*CHEMICALS to clean and prepare metal for painting

Sol-Klean.... PHOSPHORIC ACID METAL CONDITIONERS

Prezaint .... MAKES PAINT STICK TO ZINC AND GALVANIZED

Industrosolv. SOLVENT EMULSIONS FOR SPRAY WASHING MACHINES

Phosmul.... SOLVENT EMULSIONS CONTAINING PHOSPHORIC ACID

Industro .... ALKALI CLEANERS AND AIR WASH COMPOUNDS

Sep-Cote .... SPRAY BOOTH COATINGS

**Write for informative literature.*

SOL-KLEAN is used to prepare steel and aluminum for painting. Rust, oxide and oil are removed and corrosion producing agents are neutralized by it. Also, Sol-Klean etches the metal and gives it a thin phospate coating.

For use one volume of Sol-Klean is diluted with 2 or 3 volumes of water. The resulting solution is usually brushed on the metal at room temperature. It adheres to the oily surface, penetrates the oil and mixes with it, and dissolves the rust. Then the Sol-Klean is removed together with the dissolved oil and rust by wiping with rags or flushing with water.

Metal may also be cleaned and treated by immersing it in hot Sol-Klean and rinsing it in water. Sol-Klean is non-inflammable and no noxious or corrosive fumes are evolved.

Sol-Klean is easy to use and can be made an integral part of your production line.

Metal treating and cleaning chemicals for 25 years

INDUSTRIAL CHEMICAL PRODUCTS CO.
3779 BELLEVUE AVE. DETROIT 7, MICH.

Representatives in principal midwestern cities

Niederst Backstand Idler

made from very soft to very hard by using various diameter flanges to hold them on the spindle. The closer the diameter of the flange is to the diameter of the buff, the harder the wheel.

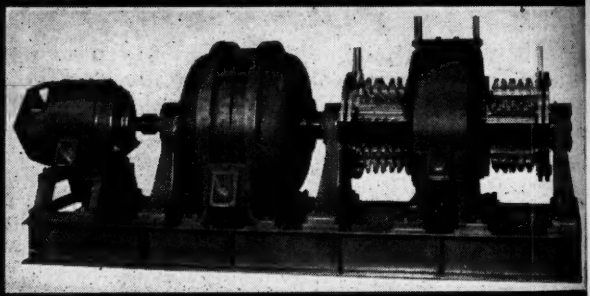
The idler pulley of the unit is an 8-inch diameter x 6¼-inch wide statically and dynamically balanced lightweight aluminum pulley. Husky ball bearings are located in the pulley arm to reduce bearing travel and speed. Since the shaft of the backstand idler revolves and the housing remains stationary, the tendency for the lubricant to be thrown from the bearings by centrifugal force is said to be minimized.

The construction of the Niederst Backstand Idler also includes a specially designed shock absorber which is said to elminate any shock to the machine if the belt breaks. Moreover, the absorber is claimed to be particularly useful where narrow belts are employed since it applies the tension gradually and helps loose buff contact wheels to attain their full diameter before complete tension is applied to them. The shock absorber has a self-releasing valve so that the counterweight used to provide belt tension may be lifted without any hydraulic back pressure.

The idler pulley arm swings on a turret which encloses the angular adjustment mechanism. The pulley arm is said to have a sufficient range so that the same

COLUMBIA MOTOR GENERATORS

for Electroplating and other Electrolytic Processes



Columbia Generators embody every feature essential for dependable, 24-hour operation. They are built for electroplating service in sizes of 6 to 20 volts, 500 to 20,000 amperes, for anodic treatment of aluminum in sizes of 40, 50, and 60 volts, 500 to 3,000 amperes. Columbia Generators for other electrolytic processes range from ½ to 250 KW, 100 to 40,000 amperes, 6 to 60 volts. Write for full information.

COLUMBIA ELECTRIC MFG. CO.

4519 HAMILTON AVE., N.E. CLEVELAND 14, OHIO

Amazing new white finish saves cost of Porcelain!

Useful on steel surfaces; also on aluminum to save scarce steel!

Approaches porcelain in resistance to stains and scratches; better than porcelain in chip-resistance, flexibility and economy of application.

Zapon DURANITE-H

is ideal for finishing metal products wherever brilliant lustre, permanence, toughness and stain-resistance are desired—refrigerator interiors, electrical appliances, metal cabinets, display signs, wall tile, fire extinguishers, food handling equipment, photographic equipment, aluminum sinks, hot water heaters, washing machines, tubs and various parts.

This *really new* finish is based on a new organic resin development. It is far superior to any urea and melamine modified alkyd enamel on the market. Thus it fills a real need for an economical finish with properties approaching porcelain.

In laboratory tests Duranite-H is not affected by acetic, citric, oleic or lactic acids; — nor by vegetable, animal or petroleum greases. It shows no signs of failure after 2208 hours in 3% Gold Dust at 120° F.;—after 3096 hours in 100% humidity at 120° F.;—after 1250 hours in 20% salt spray test at 95° F. In the pencil hardness test this enamel was rated 5H to 6H.

For application on steel, a Duranite-H primer gives maximum adhesion, flexibility and impact resistance. One coat on aluminum, after special preparation, gives exceptionally fine qualities. Duranite-H on surface-treated magnesium also gives a superior finish.

Now formulated for spraying, variations permit dipping or roller-coating. Required reduction is three parts Duranite-H to one part xylol. Recommended baking schedule is 30 minutes at 420° F.

Write, wire or phone for quick service and a demonstration of Duranite-H White Enamels (colors to be introduced soon). Zapon Division, Atlas Powder Company, New York City, Stamford, Conn., and North Chicago, Illinois.

ZAPON
REG. U. S. PAT. OFF.

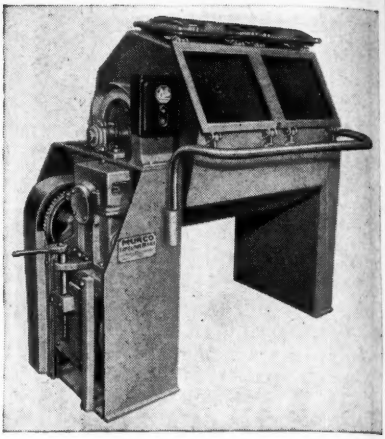
zapon production finishes

length belt may be used on a 16-inch contact wheel as well as a 6-inch diameter wheel. The backstand idler also has a wide range of lateral movement. Both angular and lateral adjustments are controlled by levers conveniently located on the lathe, thus allowing the operator control of the machine from his normal working position. The idler may be used on the right or left-hand side of the lathe.

"Murco" Tumbling Barrel

A streamline tumbling barrel which is said to have special features of interest to manufacturers that deburr, burnish, clean, polish, and smooth-surface metal and plastic parts on a production basis is now being marketed under the trade name of "Murco" by the D. J. Murray Manufacturing Co., Wausau, Wis. Compactly constructed and simply designed to provide for low maintenance, the unit is arranged so that speed changes may be effected while the barrel is in motion, thus affording a wide range of speeds to meet various operating conditions and requirements.

Specially designed dump pans are available which are mounted on casters and



"Murco" Tumbling Barrel

provided with bail handles notched for a crane hook. The discharged end of each pan is funnel shaped so as to fit into the compartment opening to facilitate barrel loading. Separating screens of various wire mesh can be mounted in frames to fit the dump pans.

All moving parts of the machine, such as the barrel, gears, pulleys, and motor, are protected with a guard rail, steel enclosures, and concealed design for safety of operation. Although light in weight, the frame and barrel are built to withstand heavy duty service.

Zapon Improved One-Coat Hammer Finish

An improved one-coat finish has been announced by the Zapon Division, Atlas Powder Co., Stamford, Conn. Available in bright, cheery colors, this product finish can be obtained in quantities from 5 gallons to unlimited amounts, ready to spray.

According to the manufacturer, Zapon Improved One-Coat Hammer Finish can be sprayed with a minimum one-coat pass because of the excellent coverage it affords. By the addition of special thinners, the hammer effect may be cut back by the user himself to produce a smooth surfaced, high gloss finish. Through the use of careful masking and drying, the material can be employed to attain a two-tone effect.

EXHAUST UNITS
for Spray Booths and Hazardous Locations

Fan Sizes 12" to 42"

Free Delivery C. F. M. 900 to 29200

Immediate Deliveries from Stock.

Also Manufacturers of a complete line of waterwash and dry type paint spray booths with accessories. *Send for details.*

M. & E. Manufacturing Co.

2571 Winthrop Ave.

Indianapolis • Indiana

CUT FINISHING COSTS 7 WAYS

USING

SEYMOUR BRIGHT NICKEL PROCESSES

Seymour Bright Nickel Processes, "C", "NC", or "CK", added to standard Watts baths, will effect these savings.

1. Deposited nickel plate requires no further finishing before chromium plating. Chrome deposits easier over bright nickel than over buffed nickel.

2. With no finishing required, or nickel buffed off, plate may be safely built up to specifications.

3. Base metals, except zinc base alloys, having acceptable finish may be bright nickel plated ***directly***. No buffing is required after nickel plating.

4. Bright nickel plates directly on fine grained copper deposits, secured by deposition or coloring.

5. Excellent throwing power due to operation at a pH to 4.5 Electrometric. Plates deep recesses.

6. Perfect adherence to properly cleaned base metals.

7. Seymour bright nickel plated articles are often chromium plated without removal from original rack.

NICKEL ANODES • NICKEL SILVER • PHOSPHOR BRONZE

THE SEYMOUR MANUFACTURING COMPANY • SEYMOUR, CONNECTICUT

Nonferrous Alloys Since 1878

SEYMOUR

Mitchell-Bradford Finish No. 146

The Mitchell-Bradford Chemical Co., 2446D Main St., (Stratford) Bridgeport, Conn., now has available a material which can be used as a clear corrosion-resistant finish on steel or as a tenacious bond for the subsequent application of paints, lacquers, and enamels over steel, aluminum, zinc base alloys, copper alloys, and magnesium. Designated as Finish No. 146, it can be either air dried or baked.

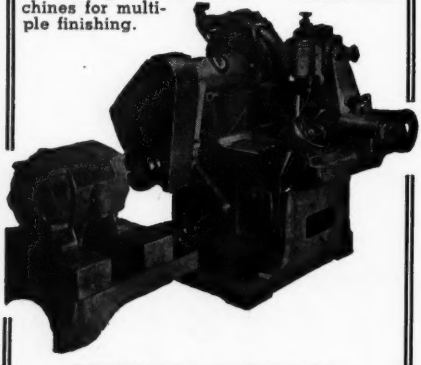
Available either clear or tinted, Finish No. 146 can be applied by the dip, spray, or brush method. The film thickness obtained by dipping is said to be approximately 0.00025 inch. The material is also formulated in a water - displacing type designated as Finish No. 146W.

When used as a bond or undercoat, Finish No. 146 can be applied either by the dip or spray method and air dried. Enamels and lacquers can then be applied over the coating and, if the lacquers and enamels are of the baking type, Finish No. 146 will withstand any of the normal baking temperatures of these coatings, it is claimed.

If Finish No. 146 is to be used as a corrosion-resistant coating on steel, it can be either air dried or baked.

FASTER FINISHING

If you require Speed and Fast Feed surfacing for polishing outside diameter of tubing, rods, steel bars and other materials, you will find this PRODUCTION No. 101 polishing machine a real solution to your finishing problem. • No centering, no chucking, no holding. It can be operated with inexperienced labor. • Tandem machines for multiple finishing.



PRODUCTION MACHINE CO.
Greenfield, • Mass.

Divco Special 71-Point Lead Anode

A special 12-foot long 71 - point lead anode with a special high conductivity hook for chromium plating long sections of tubing and pipe is now being produced under the trade name of Divco by the Division Lead Co., 836 W. Kinzie St., Chicago 22, Illinois.

In addition to providing high efficiency and great throwing power, the deep ribbed construction of the anode is claimed to minimize buckling and warping. Special and conforming anodes, as well as standard anodes, utilize the 71-point design.

Divco Special 71-Point Lead Anodes

Rohco No-Cro-Mist

R. O. Hull & Co., Inc., Dept. PF, 1270 W. 3rd St., Cleveland 13, Ohio, announces a soluble liquid product for addition in small amounts (½ to 1 gallon per 500 gallons of solution) to chromium plating baths to control the fog or mist emanating from the bath during operation. Designated as Rohco No-Cro-Mist, the product is said to change the physical form of the usual spray so that it does not escape readily and is also said to form a slight blanket around the anodes.

According to the manufacturer, Rohco No-Cro-Mist eliminates up to 99 per cent of the chrome spray and fumes that escape from chromium plating baths during operation. The resultant advantages claimed are that health conditions in the plating room are greatly improved, since all chrome fumes are eliminated from the atmosphere; rack carriers in full automatic machines, racks, bus bars, and ventilating systems are kept clean; and reracking of work for chromium plating after nickel plating is usually avoided. The operation of the chromic acid plating bath is said to be unaffected by the addition agent.

Where is the wisdom in hiding a good product under a poor finish?

PRATT & LAMBERT-INC.
Industrial Finishes
NEW YORK BUFFALO CHICAGO
FORT ERIE, ONT.

M-B Model S-VT "Spee-Dee" Pneumatic Polisher

Engineered for easy handling, a lightweight (14-oz.) pneumatic polisher for use with abrasive rolls and pencils, as well as bands and so on, is now being

M-B Model S-VT "Spee-Dee" Pneumatic Polisher

marketed by M-B Products, 130 E. Larned St., Detroit 26, Mich. Designated as the Model S-VT "Spee-Dee," the tool has a speed of 18,000 r.p.m. and includes an air control lever for starting and stopping. An adjusting screw provided controls the valve that regulates the speed of the spindle for varying air pressures.

The spindle is of heavy construction and is made of special alloy steel which is heat treated and ground to close limits. The spindle operates on special grease-sealed type bearings that require no manual or automatic lubrication, and is designed to accommodate mandrels ¼ inch in diameter. A collet having an outside diameter of ¼ inch and inside diameter of ⅛ inch is available for the spindle.

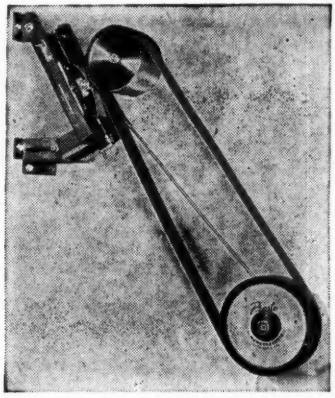
The M-B Model S-VT Spee-Dee Pneumatic Polisher is furnished complete with a hose line 7 feet long fitted with a dirt filter; two drop-forged wrenches; one ¼-inch mandrel; and two abrasive rolls. If desired, the tool can also be used with high speed rotary files.

WHATEVER YOUR POLISHING PROBLEM
Harrison
HAS THE ANSWER!
HARRISON 4A COMPOUNDS
● Cut faster
● Clean easily
● Cost less
4A
Our 25 years experience, exclusively in buffing and polishing compounds, assures you of the right compound for the right metal.
Send a sample— ask for representative to call.
HARRISON & CO., INC. Dept. 3 HAVERHILL, MASS.

"Presto" Universal Backstand Idler

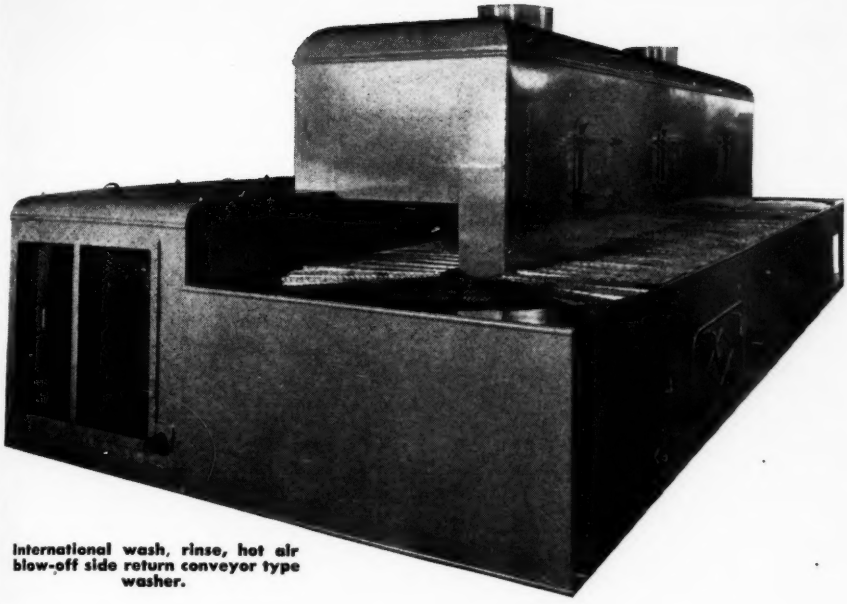
Economical conversion of standard polishing lathes to abrasive belt polishing without additional floor space is said to be possible through the use of the "Presto" Universal Backstand Idler illustrated herewith, product of The Manderscheid Co., Dept. 101, 810 Fulton St., Chicago 7, Illinois.

The unit is designed to operate efficiently on a wall, ceiling, floor, or bench, thereby eliminating the necessity of repositioning the lathe in order to obtain adequate space. A leaf-spring tensioning devise with 12-inch adjustment enables the desired tension on the abrasive belt to be easily maintained at all times. Belt tracking can be adjusted at the operator's position, and the pulley can be easily changed to provide for either right or left-hand operation.



"Presto" Universal Backstand Idler

The Presto Universal Backstand Idler is of all-steel construction and is equipped with sealed ball bearings.



International wash, rinse, hot air blow-off side return conveyor type washer.

Side Return Conveyor Type Washer

. . by *International*

Builders of Industrial Washers for Every Type of Business

Here's another example of International expert design and excellent construction — a side return conveyor type washer for small parts contained in baskets. It washes, rinses and employs hot air blow off. It is steam heated and operated by one man.

Put your large and small parts metal cleaning and washing problems up to our engineers. Their long experience in efficiently designing equipment for scores of industries insures the installation in your plant of dependable and profitable production units.

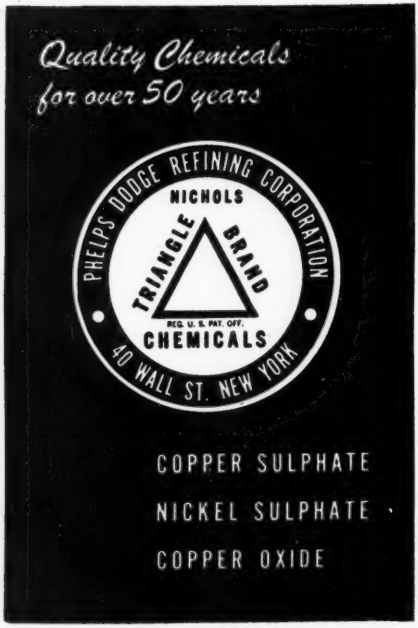
Write for folder. Recommendations and quotations promptly supplied.

INTERNATIONAL CONVEYOR & WASHER CORP.
652 E. FORT STREET • DETROIT 26, MICHIGAN

Sterling Sander Kit

The Sterling Tool Products Co., 352 E. Ohio St., Chicago, 11, Ill., announces a utility kit for housing its Sterling 1000 Portable Electric Sander and all accessories to provide a complete working sander kit. The sander kit comprises an attractive gray gloss finished 20 gauge steel carrying case equipped with sturdy latches and hasp to permit locking with a padlock. The case is divided into three compartments, the middle one of which contains the Sterling 1000 Sander while one of the end compartments contains accessories, including two extra sanding pads and a sponge rubber pad (for curved surface sanding). Also included in the kit are lubricating oil, bearing grease, two cartons of dust filters, an extra brush and spring assemblies.

The third section of the case is for a supply of abrasive papers and rubbing cloths which enables the user of the kit to have available in one case all of the accessories and materials necessary to perform complete sanding and finishing operations with the Sterling 1000 Sander on wood, metal, or plastic. The cover of the case contains a pocket into which an operating and service manual, parts price list, and handy slide-rule type abrasive selector are placed. The latter provides abrasive grit and procedure recommendations for several hundred types of sanding and finishing operations.



Beckman Model H pH Meter

National Technical Laboratories, 820 Mission St., South Pasadena, Calif., has announced a portable glass electrode pH meter which is said to combine maximum accuracy and versatility with the convenience of full a.c. operation. Designated as the Model H, the instrument can be plugged directly into any standard 110-volt 50/60-cycle a.c. line and can be easily transported from one location to another or installed permanently.

The Model H covers the full scale of 0 to 14 pH and can also be used for making millivolt readings within the range 0 to ± 410 millivolts. Measurements of pH can be made to an accuracy of 0.03 pH unit and millivolt reading to 2 millivolts, thus providing unusually high operating accuracy. A neutral position on the switch disconnects the indicating meter from the electrical circuit to avoid excessive swing-

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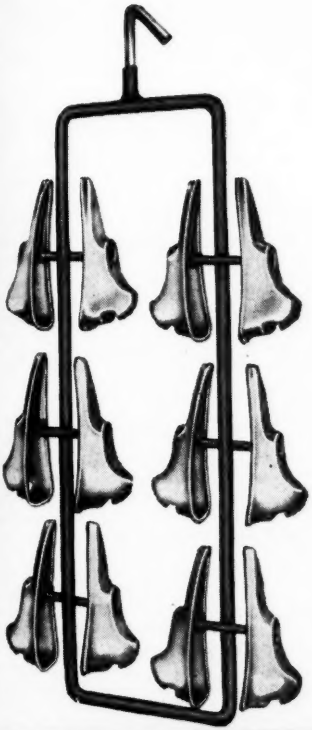

Now in production. BUNATOL No. 1000 Paste Insulation for plating racks. 100% solids. Not inflammable. No evaporation loss. No waste.

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Tremendous adhesion to any metal. Low viscosity — free dipping. Save time; insulate rack complete 60 to 70 minutes.

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Single baked-on coat makes heavy smooth insulation which lasts for months. Lowest price. Highest quality.

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BUNATOL

Beckman Model H pH Meter

ing of the meter needle during warm-up periods and when changing test samples or electrodes. Standardization with one buffer is said to provide for accurate measurements over the full range of the instrument, thus eliminating cross checking between two buffers. The instrument may be checked and corrected for drift at any time by simply pressing a button on the electrode terminal and bringing the needle to the pointer position with the standardization control.

The Model H features a built-in temperature compensator dial calibrated 0 to 100 deg. C. which can be set at the temperature of the test sample, thus automatically adjusting the measuring current to compensate for the effect of temperature on the EMF of the glass electrode and thereby ensuring correct pH reading without calculations or reference to pH temperature charts. The Model H is supplied equipped with patented internally-shielded Beckman glass electrodes with integrally attached shielded leads to eliminate electrostatic interference. Each electrode is permanently sealed and has a sturdy immersion end made of special glass. Various types, shapes, and sizes of glass electrodes are available for the Model H to meet various operating requirements—high temperature operation, high pH operation in presence of sodium ions, and direct immersion in sludges, abrasive earths, and so on.

The Beckman Model H pH Meter measures 12 x 9½ x 8½ inches overall and weighs 14 lb. net. It has a power consumption of 35 watts and is supplied complete with an electrode support rod, electrode holder, glass electrode, Calomel electrode, pint of pH 7.00 concentrated buffer, 100 ml. saturated KCl solution, and 50 ml. Pyrex beaker.

Hydro-Buff Series "500" Buffing Compound

Said to offer unusual possibilities for decreasing buffing operational time on both ferrous and non-ferrous metals, a buffing compound designated as the Hydro-Buff Series "500" is announced by the Hydro Chemical Co., Inc., 24 Clark St., East Hartford, Conn. According to the manufacturer, the compound constitutes no fire hazard since it is non-inflammable and is soluble in all proportions in the chlorinated hydrocarbons.

Hydro-Buff is claimed to be extremely well suited for plants equipped for vapor-phase degreasing operations and is also said to be readily removed in the water-phase cleaning cycle. The retention of Hydro-Buff on buffing wheels is described as good; it cuts and colors in the same operation, thus eliminating the need for rouge, it is stated. The film remaining on the piece before cleaning is said to protect the work against oxidation and staining for long periods of time.

Hilo "Clix" Air-Drying Synthetic Enamel

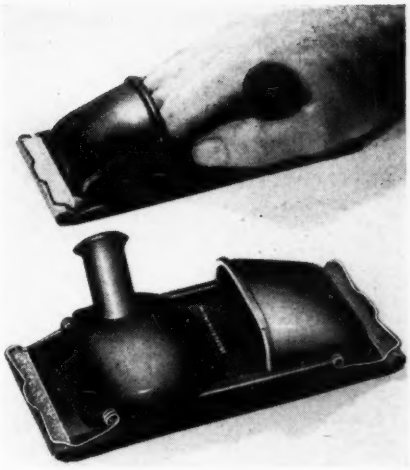
Close to lacquer speed of drying with the fullness and depth of a synthetic enamel in one coat are the advantages that are claimed to be provided by a fast air-dry coating known as "Clix" which is now being marketed by the Hilo Varnish Corp., 42 Stewart Ave., Brooklyn 6, N. Y. According to the manufacturer, the enamel possesses good gloss and high resistance to fruit acids, vinegar, grease, alkalis, and mineral spirits, thus making it well suited for use on scales, food mixers, orange squeezers, and other kitchen equipment and utensils.

Hilo Clix Synthetic Enamel is said to cover well in one coat and is claimed to dry for handling in 5 to 10 minutes and to be sufficiently hard to allow for the packing of the coated products in from 1 to 2 hours. The enamel is available in white, black, clear and colors for application to both metal and wood.

Detro Super-Flex Sander and Polisher

Designated as the Super-Flex, a sander and polisher made of flexible rubber is now being marketed by the Detro Manufacturing & Sales Co., Inc., 414 N. San Pedro St., Los Angeles 12, Calif. The unit is designed to accommodate one-third of the standard size sheet of abrasive paper, with the entire surface being utilized without any waste, and is claimed to be so flexible that it follows any surface contour.

According to the manufacturer, the special construction of the Detro Super-Flex Sander and Polisher, which includes a heel rest and handle at the back and finger pocket at the front, eliminates strain and hand fatigue, with all of the energy exerted by the user being transmitted to the block so that rough, heavy work can be finished in a minimum of time. The finger pocket at the front is also claimed to provide an excellent safety feature since it protects the fingers against cuts and bruises. The block is sufficiently thin and flexible to afford the user sensitive feel of the work for fine finishing. Since the abrasive paper is held firmly in place by strong springs, any motion can be used in sanding, including a straight, side, or rotary motion. A special lamb's wool bonnet furnished with the unit enables it to be quickly converted into a polisher with the same advantages as when used as a sander.



Detro Super-Flex Sander and Polisher

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WATER CURTAIN
SPRAY BOOTH
OPERATION
Eliminates

PLUGGED NOZZLES • WATER BREAKS
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LOSS OF PRESSURE
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• • •

FOR DETAILS WRITE

The Du Bois Company
CINCINNATI 3 OHIO

Gem Paint Brush Cleaner

A device for cleaning paint brushes mechanically is now being marketed under the trade name of Gem by the Olsen Sales Co., 44-02 11th St., Long Island City 1, N. Y. The design includes a gripping device comprised of Neoprene rubber and brass springs that is said to grip any type of paint brush handle and hold it firmly, regardless of the speed, while it is being spun in opposite directions as the bristle is submerged in the cleaning solvent. The driving gear is of steel, while the other gears and the handles are of aluminum.

Gem Paint Brush Cleaner

To clean a paint brush, six or seven quarts of solvent are poured into a 10-quart water pail. Following this, the gripping handle of the Gem Paint Brush Cleaner is pulled up to release the gripping device and the brush handle is firmly locked by moving the center handle down. The Gem is now placed on the water pail using a cover, furnished as part of the equipment, which has a center opening that allows the soiled brush to pass through and become submerged in the solvent. The driving handle is then pulled up and down, thereby spinning the soiled brush in opposite directions in the solvent. A few turns of the brush is said to be sufficient to thoroughly cleanse all the pigments from the bristle. To dry the brush, the same operation is duplicated over an empty pail.

The Gem Paint Brush Cleaner is recommended for use with turpentine, benzine, or naphtha solvents.

Bradford Inner-Lock Paint Spray System

An inner-lock paint spray system comprising a head which is designed for attaching to any suction type paint spray gun and that permits instant changing of disposable paint cups containing different colors or types of finishes is now being introduced by the Bradford Products Co., 2021 Cass Ave., St. Louis 6, Mo. According to the manufacturer, the system is unusually economical and useful in factories or shops where spray painting, retouching, or touch-up work must be performed either regularly or at infrequent intervals.

Bradford Inner-Lock Paint Spray System

A patented inner-locking device incorporating an easily-operated thumb lever is used to firmly lock the paint spray head to the disposable rigid metal-bottom paper cup. This arrangement is said to permit rapid changeover from one color paint to another since one paint cup can be instantly detached and another locked to the head. Inner-lock self-sealing lids protect the paint cups when not in use and preserve carefully mixed colors.

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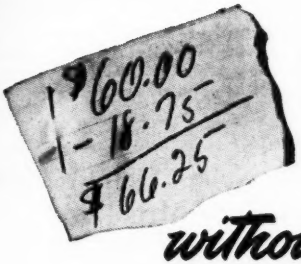

How 19,000 companies up take-home pay *without upping payrolls*

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Your business is closely dependent upon the national economy, which will be strengthened by distribution of the public debt as widely as possible. How that works is described in the free brochure shown at the right.

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FREE BROCHURE *expresses the views of two business leaders. Be sure to get your copy from the State Director . . . today!*

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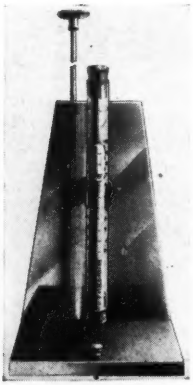
Gardner Visco-Meter

For rapidly measuring the viscosity of extremely viscous oils or similar products, the Henry A. Gardner Laboratory, Inc., 4723 Elm St., Bethesda, Md., has developed the Gardner Visco-Meter illustrated herewith. The unit consists of a precision bore Pyrex glass sample tube approximately 155 mm. long and stoppered at both ends; a clip to hold the tube, which is positioned to a metal frame used to revolve the tube ½' revolution by means of a rack and pinion arrangement; and a metal frame and heavy base plate unit. On the sample tube are 11 engraved rings spaced equidistantly. The rings are numbered from 0 to 10 inches. The rings and numbers are black ceramic enamel baked on at high temperature to provide for permanence. The tube holder is of plated brass construction.

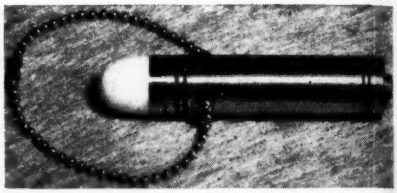


Gardner Visco-Meter

The Gardner Visco-Meter operates on the principle that the time required for a bubble to rise in a liquid is directly proportional to the kinetic viscosity of the liquid. The size of the tube and the distance of travel have been chosen so that the time in seconds is numerically equal to the viscosity in stokes. Thus, if a bubble requires 25 seconds to travel from one mark to another, the liquid has a viscosity of 25 stokes. To convert stokes to poises, they are multiplied by the specific gravity of the liquid.

"Mira-Spun" Finish for Cylindrical Metal Pieces

The Contract Finishing Division, Patent Button Co., Waterbury, Conn., has developed a unique finish for cylindrical metal pieces, to be known as the "Mira-Spun." As the name implies, it is a spun finish which imparts a mirror-like sheen to metal parts. It is obtained automatically by spinning the work for a few seconds before a thick coating of synthetic enamel is applied. The enamel is then baked.



Micro-Lite with "Mira-Spun" Finish

The Mira-Spun Finish is particularly recommended for use in conjunction with contrasting bands of enamel.

Amercoat Plastic Lined Pipe

The Amercoat Division, American Pipe & Construction Co., P. O. Box 3428, Terminal Annex, Los Angeles 54, Calif., has developed plastic lined steel pipe to per-

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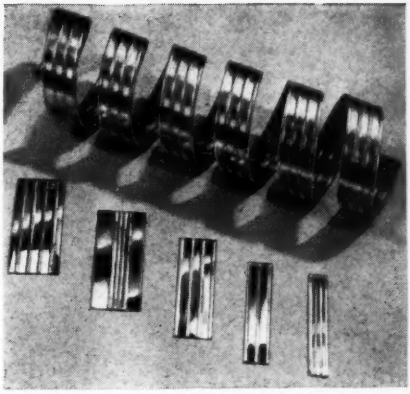
mit the handling of strong chemicals in industries where pipe corrosion is a particular problem.

In producing the plastic lined pipe, vinyl resins are compounded with the proper chemical resistant pigments and plasticizers and are then extruded in the form of a tube which has a wall thickness of fifty to sixty thousandths of an inch. The plastic tube is then placed inside steel pipe and bonded to it by a special process. The tube is flared out over the flanges, thus providing a continuous chemically-resistant liner throughout the entire piping system.

American Crimp Metal

The American Nickeloid Co., Peru, Ill., announces a preplated metal pattern which is available in coils in steel base metals up to 0.015 gauge and in zinc base metals up to 0.018 gauge. Designated as Crimp Metal, the pattern consists of a round embossing—raised or depressed—on the polished side of the metal, running parallel to the length of the coil. Embossed or debossed, the pattern is said to make a striking design and increase the rigidity of the metal. Moreover, by varying the distance between the round embossings, a variety of interesting variations on the basic design can be obtained.



American Crimp Metal

American Crimp Metal is supplied ready for fabrication without plating, polishing, or buffing and is recommended for packaging, display, trim, and structural use.

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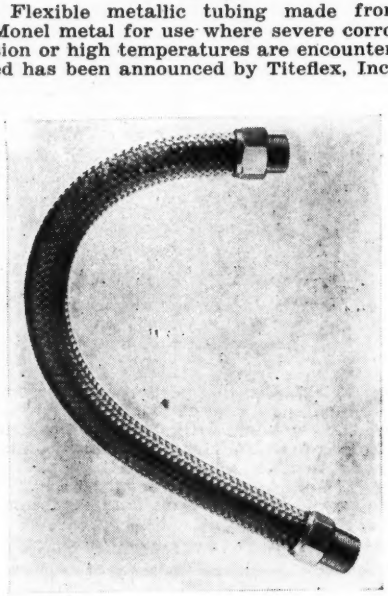
Sulphur Products Co.

Greensburg 9, Pa.

Titeflex Monel Metal Flexible Tubing

Flexible metallic tubing made from Monel metal for use where severe corrosion or high temperatures are encountered has been announced by Titeflex, Inc.,



Titeflex Monel Metal Flexible Tubing

422 Frelinghuysen Ave., Newark 5, N. J. The tubing is recommended for applications where corrosion resistance is required or where the temperature of operation is about 300 deg. Fahrenheit.

Designed to resist the attack of mineral and organic acids, alkalis, and salts over a wide range of concentration and exposure conditions, Titeflex Monel Metal Flexible Tubing is supplied for four temperature ranges, the temperature range depending upon the melting point of the solder used in the seam of the innercore. Because of its suitability for high temperature resistance, the tubing is said to be unusually strong.

Titeflex Monel Metal Flexible Tubing is supplied in the same sizes and with the same types of fittings as the standard Titeflex brass flexible tubing. It is furnished with either single or double bronze braid and brass fittings. Where special conditions require, Monel fittings and Monel braid can be supplied.

Unichrome Coating 218

The development of a synthetic coating which can be built up to extra heavy thicknesses has been announced by Unichrome Chromium, Inc., 51 E. 42nd St., New York 17, N. Y. Primarily designed to insulate and protect electroplating racks, the material, which is designated as Unichrome Coating 218, is said to contain 100 per cent solids, with nothing to evaporate. It is a baking synthetic which can be applied by the dip or spray method, and, upon curing at 350 deg. F., becomes a sleek, elastic coating. On some racks, thicknesses up to ¼ inch can be obtained within two hours on areas where such a degree of protection is desirable.

Unichrome Coating 218 is claimed to withstand mechanical abuses without chipping, tearing, or lifting from the equipment to which it is applied. It is also said to withstand a wide variety of strong chemicals in addition to hot cleaning solutions and all plating baths. Its characteristics are claimed to make the material especially suitable for use on dipping baskets, wire screens, mixing equipment, propellers, rotors of air blowers, and as gaskets and linings.

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Binks Model 18 Spray Gun

Development of a high precision production spray gun which is designed to handle all types of finishes is announced by the Binks Manufacturing Co., 3114-18 Carroll Ave., Chicago 12, Ill. Designated as the Model 18, the gun features controls which are conveniently located at the back of the unit. The spray pattern is adjustable from round to flat with all intermediate patterns. The gun body is of drop-forged aluminum with black electrolytic coating to provide for long life surface protection. The gun head and nozzle are made of tough drop-forged bronze with unusually heavy plating.

The material nozzle of the Binks Model 18 Spray Gun is of hardened steel. A hardened steel needle valve included in the design is easily adjustable to compensate for wear. The self-centering nozzle of the gun is designed on the tapered seat principle and is utilized with a cartridge type air valve. The comfortable two-finger trigger of the gun is protected from wear by a hardened plate on the back. All gun parts are made of wear and corrosion-resistant materials. A large air passage through the unit is said to provide for increased efficiency. All gun connections are of standard pipe threads.

Binks Model 18 Spray Gun

For use in the ceramic industries, a spray gun designated as the Model 18V is available. This gun is the same as the Model 18 except that tungsten carbide inserts are provided in the material nozzle and needle valve to ensure long life when abrasive materials are used.

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